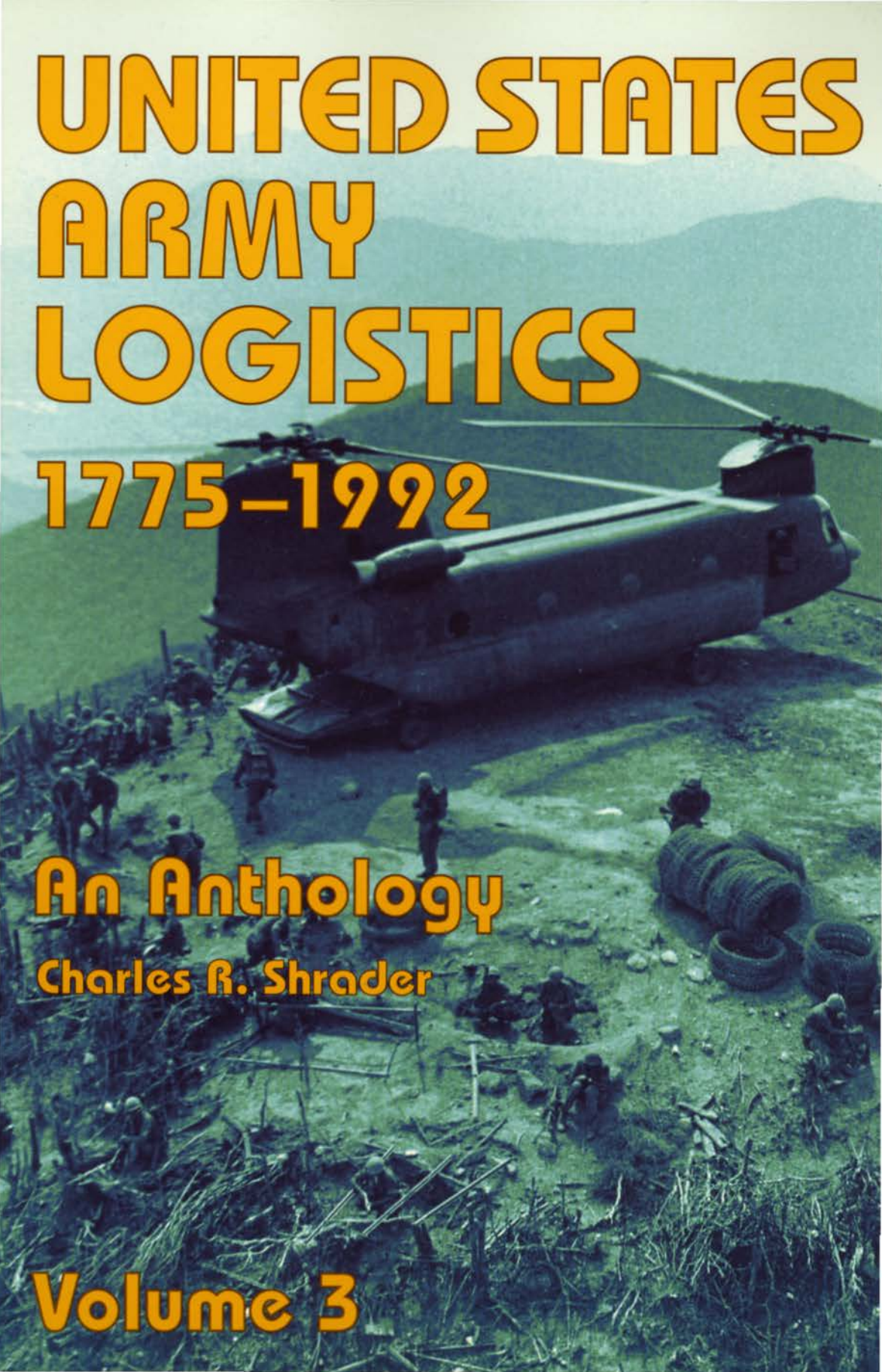
UNITED STATES ARMY LOGISTICS 1775–1992



An Anthology

Charles R. Shrader

Volume 3

United States Army Logistics, 1775–1992
An Anthology

Selected and Edited
by

Charles R. Shrader

In Three Volumes
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Logistical Support in Korea

Introduction. In this relatively brief article Army historian James A. Huston summarizes the logistical activities of the United States Army in the Korean War, with particular emphasis on the lessons learned for the future in this "second greatest of [America's] wars from the standpoint of its logistical contributions." He covers all types of logistical operations at various levels, focusing on theater logistical plans and operations.

In the movement and support of her own forces, in the support of the forces of the other members of the United Nations, and in the support of the forces of the Republic of Korea, the United States was involved in one of the greatest logistical undertakings of her history.

The total tonnage of supplies of all classes shipped from the United States to the Far East during the three years and one month of the Korean conflict—approximately 31.5 million measurement tons—was more than twice the tonnage shipped from the United States in support of the American Expeditionary Force in World War I during the 19 months from June 1917 through December 1918. It was 82 percent greater than the total shipment of supplies (17,277,000 measurement tons) for the support of Army ground and air forces in the Southwest Pacific Areas—General MacArthur's command—in World War II in the 37 months from August 1942 to August 1945.

$17 Billion Price Tag

How much military operations cost the United States in terms of money for goods and services can only be approximated very roughly. On the basis of data prepared in the Statistical Analysis Section, Supply Planning Branch of G4, the Office of the Comptroller of the Army estimated the total cost to the Army of operations in Korea for the Period 27 June 1950–30 June 1953 to be about $17,200,672,000.

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This included something like $11,756,134,000 for supplies shipped to the Far East (excluding equipment which accompanied troops), $1,522,925,000 for contractual services in the movement of troops and supplies, and $1,729,152,000 for the cost of activities of installations both in the United States and the Far East directly supporting the Korean operations. The pay of soldiers in tables of organization and equipment units amounted to about $2,192,461,000 for the period.

One of the factors which complicated the accurate calculation of costs (as it did the estimation of requirements for service troops) was the support given allied forces in Korea. In the long view this aspect of logistics might be one of the most significant of all because the United States seemed to be firmly committed to a policy of support to allies as a principal means of ensuring security for the future. If the American policy were successful, any future outbreak of war also would be met by an allied force. Experience in logistical cooperation in Korea could have much significance for those future occasions if and when they arise.

World War II a Prerequisite

There could have been no Korean conflict without a World War II preceding it. It generally is true to some extent that the supplies and equipment produced in one war tend to become the reserve of the next. Modern warfare requires a substantial cushion for meeting matériel requirements during the first one to two years of a conflict before industrial mobilization permits current demands to be met from new procurement.

During World War I the United States had to depend on her allies to provide that cushion, American forces using a large proportion of British and French weapons, vehicles, and other equipment throughout that war. In World War II certain equipment left over from World War I proved to be valuable in the early stages of training and combat, but more important was the resistance of Great Britain and Russia and the lend-lease program which allowed the United States an additional 18 months after the fall of France in which industrial mobilization could begin to become effective.

Equipment left over from World War II provided the only cushion in the Korean conflict. Without it, combat operations in Korea simply could not have been supported. In this case the preceding war had been so recent, and its scope had been so vast, that huge quantities of matériel still were available.

Stocks maintained in various matériel reserves were almost entirely of World War II supplies, for there had been virtually no new procurement in most items since the end of World War II. In addition, great quantities of World War II equipment remaining on the Pacific islands fed the rebuild plants in Japan to make up serious shortages.

But the importance of World War II in the logistical support of the Korean conflict went beyond the matter of essential matériel reserves. The very procedures by which the ports of embarkation and the technical services were able to fill requisitions and build up shipments of supplies quickly were the result largely of practices which developed during World War II.


MANCHURIA
Ch'ongjin
Nanam
Yalu River
Hyesanjin
Kapsan
Kanggye
Ch'osan
Suiho Dam
Changjin Reservoir
Pujon Reservoir
Songjin
Yalu River
Pukch'ong
Iwon
Tanch'on
Antung
Sinuiju
Unsan
Ch'ongch'on River
Taedong River
Hamhung
Sonch'on
Hungnam
SEA
OF
JAPAN
Tokch'on
Sinanju
Sunch'on
Wonsan
PYONGYANG
Yangdok
Nam River
Imjin River
Chinnamp'o
Kosong
Sariwon
Ich'on
P'yonggang
Kumhwa
Changyon
Haeju
Kaesong
Inje
Yangyang
38°
38°
Ongjin
Yonan
Ch'unch'on
Kimpo
Hoengsong
Samch'ok
YELLOW
Inch'on
SEOUL
Han River
Wonju
SEA
Suwon
Osan
Ch'ungju
Ulchin
Ch'onan
Yongju
Yech'on
Ch'ongju
Andong
Sangju
Yongdok
Taejon
Kum River
Kasgnam
P'ohang-dong
Kunsan
Chonju
Taegu
Nakdong River
Nam River
Chinju
Masan
Pusan
Kwangju
Sunch'on
T'ongyong
Yosu
Mokp'o
Usuyonggo
TSUSHIMA
KOREA
LEGEND
Main road
Railroad
River
Capital
Town

Japan Highly Important

The logistical importance of Japan in this entire picture hardly could be exaggerated. The depots and other facilities for backing up supply activities in Korea were located there. The essential rebuild program depended on Japanese industrial facilities and labor—resources which also provided vital services in the transportation and handling of supplies and the movement, housing, and hospitalization of troops.

The Eighth Army in Korea fought with virtually the same weapons the Army had used in World War II. Recoilless rifles, developed just at the end of World War II, had their first extensive battlefield tests—generally with quite satisfactory results. A new, larger "bazooka"—the 3.5-inch rocket launcher—became available just after the beginning of the conflict, and several thousands of them were flown to Korea for use against Communist tanks. They quickly won favor, but as it turned out the Communists practically stopped using tanks, although the Chinese and North Koreans captured a number of the new bazookas and turned them against American tanks.

No completely new American tank got into action in time to prove itself on the battlefield in Korea. All forces in Korea depended mostly on World War II trucks during most of the conflict—and most of those came from rebuild and overhaul operations in Japan. New model 2½-ton cargo trucks and jeeps (costing more than twice as much as the World War II models) began replacing the older models in American units in the summer of 1952. Thereafter the World War II trucks, as they were replaced, were transferred to the Republic of Korea Army.

Ammunition Supply Problem

Probably no item of supply attracted more public attention than ammunition. It seemed incredible to many that American production still had not been able to overcome all shortages of ammunition more than two years after the outbreak of war in Korea. Locally, shortages could be attributed, not to the exhaustion of available supplies, but generally to difficulties of local distribution.

Yet it was true that total stocks in the Far East Command, for a number of significant types of artillery and mortar ammunition, frequently did fall below *the authorized* level of supply (90 days), and at times dropped well below the 60 days of supply defined as the *safety level*. Reasons given for the failure to maintain full authorized levels were:

1. The unusually high rate of fire deemed necessary by General Van Fleet to offset the enemy's large numbers in particular situations.

2. The fact that no ammunition production lines of any consequence were in operation in the United States.

3. The long lead time—about a year and a half—required to establish production lines and get quantity production.

4. The fact that the Department of Defense, holding to an assumption of early termination of the conflict, set restricted budgetary guidelines for ammunition procurement.

Yet the real shortage was not in Korea. There all the ammunition needed for any particular operation was available to the extent that it could be moved with existing transportation. The real shortage, although this was not the aspect receiving most public attention, was in the Army's total ammunition resources in relation to its worldwide commitments and responsibilities

Limited by Transportation

The burden on transportation imposed by the unusually high rates of expenditure of artillery ammunition in Korea at various times—particularly when the days of fire and authorized levels were increased—was as significant as the drain on the ammunition supplies themselves. When United Nations forces struck back at the Chinese in May 1951, for instance, transportation probably was the limiting factor on what could be done. An operations research team which surveyed the Soyang River campaign concluded:

> It would not have been possible to support a larger number of troops, or a larger or more intensive campaign, with the transportation capacity then available to X Corps.

Land transportation in Korea probably was the key to the entire logistical effort in support of operations there. This meant dependence on the Korean railways for major supply shipments, supplemented to some extent by highway transportation. Delivery to forward units was mostly by motor trucks, augmented in areas of rough terrain by the hand carriers of the Korean Service Corps. Perhaps the most serious continuing bottleneck in the transportation system was in moving goods out of the port areas, and this situation was aggravated by the concentration of depots in the Pusan area, near the port facilities.

For logistical support of combat operations across the world's largest ocean, sea transportation, of course, was essential too, but once sufficient shipping had been put into service early in the conflict, overseas movement of supplies and troops proceeded relatively smoothly under the supervision of the Navy's Military Sea Transportation Service.

Air Freight Negligible

Air movements by Military Air Transport Service, directed by the Air Force, also went smoothly once agreement had been reached on the determination of priorities. But the very effectiveness in delivering small shipments of high-priority cargo, and the glamor of speed associated with individual flights, tended perhaps to exaggerate the significance of the Pacific airlift in supporting the troops in Korea. A very small part (less than one percent) of the supplies shipped from the United States went by air; the planes available could not approach the speed of Liberty ships in delivering 10,000-ton quantities, and air transportation was far more costly than sea transportation.

The air age really had not yet arrived insofar as normal transportation was concerned. Sometimes examples, intended to emphasize how the world had

shrunk in point of time-distance, were exaggerated. It might be suggested, for example, that Tokyo now was closer to San Francisco, in time, than Philadelphia was to New York during the Revolution. This was held to be so because an airplane in 1953 could span the Pacific more quickly than a horsedrawn coach could go from New York to Philadelphia in 1780.

But this comparison is not altogether a fair one. It compares a very special method of travel with a common method. An army might march from New York to Philadelphia in a matter of five to seven days. In 1953 no army could reach Tokyo from San Francisco in that time. It took nine days after the first warning for first elements of the 2d Division to begin moving from Tacoma in July 1950, and it took 29 days for the entire division to complete preparations and sail, and it was 34 days from the time that the first ship sailed from Tacoma until the last tactical unit arrived at Pusan.

In the period of the Korean conflict, sea transportation still was normal. But air transportation did make important contributions in at least two ways—in delivering small quantities of essential items quickly, and particularly in the evacuation of casualties. Its greatest value was in its being—so that it would be available for emergencies.

The evacuation and hospitalization system generally was about the same as had been used in World War II. Probably the most significant developments in this connection were the general use of Mobile Army Surgical Hospitals, the use of be helicopters for battlefield evacuation, and the general reliance on air transportation for the evacuation of casualties to Japan and to the United States.

Maintenance Difficult

Difficulties in the maintenance of equipment in Korea appeared almost from the outset of hostilities. The additional strain put on vehicles by intensive use over poor roads and mountainous terrain, mechanical weaknesses in certain of the tanks, and periods of intensive firing of artillery contributed to these difficulties. But much of the trouble in the early months of the conflict seemed to be more the result of a lack of well-trained men to handle the necessary organizational and field maintenance than of defects in the design or materials of the equipment itself. Most of it was of types which had held up well under strenuous combat conditions in World War II. Lack (or misuse) of tank repair men in the infantry regiments was especially noticeable. Another difficulty, at least until 1952, was the inevitable shortage of spare parts. This was an especially acute problem for the great variety of highly specialized engineer equipment which had to be kept in operation.

Which was the most important aspect of logistics in Korea? We might as well ask which is more important, the gun or the ammunition; or which is more important for a truck, the motor, the drive shaft, or the fuel? Probably the most general limiting factor in Korea was transportation.

But by the very nature of logistics some one or more elements of supply, transportation, or services almost always must be limiting factors in any given situation.

If Korea had been a country covered with rail lines and express highways, with all the rolling stock, vehicles, and fuel desired, then something else—probably the supply of ammunition—would have been the limiting factor. Then if all the ammunition in the world had been available, some other factor, perhaps the supply of artillery tubes, would have set the logistic limitation.

Almost never will all logistic requirements be satisfied in an exact balance, and as long as that is true, and as long as military operations are governed by the finite, some phase of logistics is bound to be a limiting factor.

It, therefore, would serve no useful purpose to isolate one element of logistics and show that it limited the scope of possible military operations, unless it also could be shown that all the other logistical requirements could have been met to support the operations in question.

Couldn't Happen Again

It is difficult to draw generalizations from the Korean experience which would have application at other times and places. There never could be "another Korea." Even a resumption of hostilities in Korea would be under very different conditions from those prevailing in June 1950.

Only by drawing heavily on World War II equipment both in the Far East and in the United States, and on the resources of Japan, was it possible to meet the logistical requirements.

No Prepared Plans Ready

Neither the Far East Command nor the Department of the Army appeared to have any prepared plan for support of military operations in Korea. The decision to go into Korea with ground forces apparently was an off-the-cuff decision supported by a spontaneous recommendation from the Far East without reference to logistical plans and analyses. When questions were raised in the Department of the Army, in a general way, about logistical feasibility of a campaign in Korea, affirmative responses were based more upon faith than upon studied inquiry. At the moment the question was not what *can* be done, but what *must* be done. In meeting the first critical demands Army leaders in Washington, Tokyo, and Pusan mostly had to "play it by ear." Detailed planning did begin at once, of course, but that planning might have been done more quickly and more effectively had there been some planning preceding it.

Perhaps this experience would suggest that something might be gained by developing detailed plans for supporting various types of possible operations in potential areas of conflict in all parts of the world. It is patently impossible to have concrete plans to meet all eventualities. Yet there is an advantage to be won in the very process of planning, even if the plans themselves have to be "thrown out the window" when the emergency comes.

Experience Is Valuable

In the planning process certain data must be gathered and evaluated, procedures considered, limitations studied, and assets analyzed. This makes simpler and quicker and more efficient the actual support when the necessity arises. Even if all proposed lines of action have to be rejected in favor of something entirely new, at least the search for workable plans will not have to be delayed by "blind alley" approaches which might have been discovered earlier. Moreover, new data may be put to use more quickly and effectively if only the basic questions have been sought out in advance.

Improvisation depends upon imagination, and imagination depends upon experience—personal and vicarious. This is a major contribution of the service schools, and it is a function of continuous on-the-job planning. This too is the place of military history—to provide rich experience out of which imaginative leaders will create new methods to meet new situations.

Imagination Helped

Scores of examples could be cited where imagination triumphed over adversity in providing support for the Korean battles. As the early North Korean offensive gained momentum in July 1950, the 2d Division moved in record time from Fort Lewis, Washington, to the Korean battlefield.

After the Chinese intervention imaginative officers both in Japan and in the United States got emergency shipments of equipment under way quickly. Such procedures as MARINEX and CONEX provided means for rapid sea transportation of high priority cargo to supplement the airlift.

Improvised cable lifts performed valuable service in delivering supplies and bringing out casualties from almost inaccessible battle positions in the Korean mountains. Korean hand carriers and helicopters soon became almost indispensable for supply and evacuation across the rugged mountain country.

Helicopters never were available to the Army in large enough numbers to play the role planned for them in transporting supplies. Most Army helicopters were devoted to the evacuation of casualties, but the limited experience of Army units, and to a greater extent that of the Marine Corps, suggested that helicopters could be expected to play an increasingly significant part in future supply operations.

Quartermaster Innovation

The perfection of Quartermaster service centers was one of the outstanding developments of the Quartermaster Corps in Korea. The combination of shower and clothing exchange points and repair and maintenance facilities in the same vicinity went a long way toward saving clothing while contributing to the health and morale of the troops. On the other hand, a great deal of waste in clothing and equipment, particularly in the discard of unpopular items, was evident at various times. The unfortunate failure to get winter clothing and equipment to many of the

troops in North Korea before the onset of cold weather in 1950–51 indicated how events might nullify particular plans in that kind of a situation.

Pusan remained the primary depot area as well as the primary port in Korea throughout the war. As such it probably was the most lucrative target for an enemy bombing force in all Korea. Destruction of the port and storage facilities in the Pusan area would virtually have paralyzed the United Nations military effort. Here certainly no lesson was to be learned from the fact that they got away with such a concentration of supplies and facilities. On the contrary, everyone seemed to recognize the danger, but because of a shortage of service personnel, the lack of suitable facilities and necessary transportation lines elsewhere—together with a certain amount of inertia—little was done to correct the situation before the end of hostilities.

Mobile Hospitals Tested

Korea provided the first operational use of the Mobile Army Surgical Hospital in the evacuation and hospitalization system. This hospital had been organized as a 60-bed unit to be located with or near division clearing stations for the purpose of providing surgical treatment for casualties too badly injured to be evacuated further to the rear without first having such attention.

Actually, the Mobile Army Surgical Hospitals supporting the Eighth Army were expanded to 200-bed units, and they served as small evacuation hospitals during most of the conflict. Apparently the limited and channelized surface transportation facilities in Korea, and the growing reliance on air transportation, made it less practical to use these hospitals in the way originally intended. In the last months of the conflict some of these mobile hospitals were cut back to 60-bed units, and it seemed likely that the use of the 60-bed units with divisions would continue to be regarded as standard practice in places where communication facilities would permit it.

Air Evacuation Rapid

Evacuation of patients both to Japan and to and within the United States was mostly by air. Army Medical Service officers in Japan developed a system for receiving patients by medical holding companies at three different airfields, and for screening them at three separate hospitals so that congestion at a single receiving hospital could be eliminated. Within the United States the hospital train practically was a thing of the past, as patients arriving from the Far East were flown to hospitals chosen near their respective homes for convalescence.

For other uses than the evacuation of casualties, air transportation within the Far East Command was most valuable for emergency delivery of specific items of equipment and supplies—such as the dropping of supplies to elements of the 1st Marine and 7th Infantry Divisions isolated in the Chosin Reservoir area in November-December 1950, including the parachute delivery of an M–2 treadway bridge.

In the control and operation of air transportation the division of responsibility among the Air Force, the Transportation Corps, and the Quartermaster Corps was not clearcut and firm. This was a question demanding further study.

New Methods Devised

Various modifications in techniques and procedures developed in Korea recommend themselves for future consideration. Soldiers thriving on fresh vegetables flown from hydroponic farms in Japan are not likely to expect a less attractive bill of fare in the future. Engineers facing an "impossible" task of railway bridge building some time in the future could recall the reconstruction of the Kilra-Chon bridge south of Wonju in April 1951—the effort which called for the erection of two prefabricated replacement towers 103 feet high, the fabrication of a continuous girder 270 feet long and weighing about 130 tons by bolting and welding I-beams, and the launching of the girder by means of special rollers made in Japan.

Supply officers looking to the setting up of Class IV supply projects for some future operation might turn to the five-quarters' (15 months) engineer Class IV supply forecast system. Such a system was developed late in the Korean conflict to assure a more uniform flow of Class IV materials by providing a constant review of requirements and revision of the current status of supply for the benefit of each supply agency concerned.

There is something to be said for a suggestion that the United States, in cooperation with her allies, should stockpile all kinds of military supplies at strategic points near areas of potential danger in various parts of the world. Under such a plan cadres of logistical commands could receive, store, and protect the supplies; then, if an emergency developed, service troops could be flown to the bases maintained nearest the threatened area to begin full-scale supply operations.

It would be a problem to maintain significant quantities of matériel in remote places, but such a distribution would make it possible to maintain lower depot levels in the United States, and that such supplies could be useful was demonstrated in Korea where equipment which had been left unattended for years on Pacific islands played an essential part in the success of operations.

How to Divide Manpower?

Perhaps the general problem from which it was most difficult to draw definite conclusions was the question of personnel to perform all the logistical functions needed. It has become common to make the ratio of combat troops to service troops the measure of efficiency in the Army. By itself this ratio may mean nothing. The important factor is the total amount of effective firepower which can be brought to bear against the enemy. If the greatest total of effective power can be delivered with one combat man for each service man, then this is the desirable ratio; but if 1,000 service troops for one combat man are needed to achieve that maximum, then that is the desirable ratio.

Local Labor a Big Help

If it impairs combat effectiveness, a small ratio of service to combat troops is to be avoided rather than sought as an objective in itself. But the situation was such that the ratio in the Far East, whatever that ratio happened to be, would not necessarily be a reasonable one for other areas. In Japan, American forces had the services of an effective labor force which could not be counted upon in all possible theaters of operations. The Japan Logistical Command estimated that if all the supply and service functions of that command had been carried out without the use of Japanese workers, an additional 200,000 to 250,000 service troops would have been required.

The use of local labor in Korea was much less efficient, although hardly less significant, than in Japan. By the fall of 1951, United States forces in Korea were employing over 77,000 native workers in the rear area in addition to the 50,700 members of the Korean Service Corps and 30,000 other laborers within the corps areas. Without close supervision Korean laborers often were careless and undependable. But without their assistance it scarcely would have been possible to deliver supplies to frontline units or to complete when needed many of the engineering construction projects.

Contract labor, which put a premium on inefficiency by making the contractor's payment dependent upon the expense of the labor be furnished, was so unsatisfactory that in the summer of 1951 the Army resorted to a policy of direct hire labor whenever possible. But the greatest shortcoming was in the lack of training and doctrine for the employment of indigenous labor in the Army. Here was something upon which the Army was depending for its very existence in the Far East, yet no one had thought about it sufficiently to include planning, training, and indoctrination of Army staff officers in the proper use and supervision of such labor.

Detailed Policy Needed

In the 2d Logistical Command, General Paul F. Yount set up a school, intended originally to train Koreans in American methods, but which became a school for training Americans to supervise Korean workers. Moreover, a firm Army policy was needed which would spell out clearly the responsibilities for the procurement, training, organization, control, assignment, and administration of indigenous personnel. The lack of such a doctrine resulted in having various headquarters and staff sections at times work at cross-purposes in these matters. As a result of a recommendation of the Army Logistic Support Panel in October 1951, the Quartermaster Corps was assigned the responsibility of operating a centralized common labor service in active theaters of operation.

The use of local labor, both in Japan and Korea, undoubtedly reduced the number of service troops required, although it meant hiring more than an equivalent number of local workers. On the other hand, service units were called upon for a much greater burden than otherwise would have been the case by reason of

the logistic support furnished to other United Nations and Republic of Korea forces. Curiously enough the number of service troops actually used in the Far East (in 1951) approximated closely the 43 percent of theater forces (not counting the organic service units of the divisions) established in the Army's planning data.

Not Enough Technicians

Finding enough skilled technicians for logistical support activities was a problem which became more pronounced with each technological advance in the conduct of warfare. A shortage of trained specialists in the Army already had become so acute, even before the attack in Korea, that in June 1950 the Department of the Army published a directive providing for the ordering of qualified men to specialists schools involuntarily, if enough qualified were not available. Someone had to do those service jobs if the Army were to carry out its mission at all.

At the same time, men assigned to logistical duties doubtless were aware of a certain amount of resentment against "rear echelon" troops on the part of combat men and others who intimated that a man was doing something less than his full share unless he were firing a gun at the enemy. Apparently moved by an underlying compulsion to fairness, that all men ought to be placed in jeopardy of life and limb in combat to about the same extent, G3 offered a proposal in 1951 that all men be given the same basic training and that individuals be interchanged between combat and noncombat units. G4 refused to go along with the proposal on the ground that branch training was essential, and that an interchange of soldiers between combat and service units would reduce both combat effectiveness and logistical effectiveness.

Dual Role Headquarters

In administrative organization the Far East Command retained certain discrepancies until the beginning of 1953 by which time it had developed a theater structure closely paralleling that outlined in established doctrine. The principal modifying factor on the higher level was the United Nations Command Headquarters—principally the main divisions of Far East Command Headquarters with the addition of combined staff sections including members from other cooperating nations. But the actual direction and execution of logistical activities remained on a national basis, and the logistical organization developed by 1953 generally "followed the book," with certain local adaptations.

The principal deviation from the "normal" was in the designation of the Korea Communications Zone (KCOMZ) and in the organization of a single section headquarters under it. Actually, Army Forces, Far East, served as the theater communications zone headquarters, while KCOMZ really was cast in the role of a base or intermediate section, yet the resulting anomaly, if it were such, probably was traceable to the book itself. In a unified command where an Army officer was commander in chief, it was to be expected that he would command military operations directly through the field army commander (or army group commander if there

were one). With no tactical functions, the theater army headquarters, in this case Army Forces, Far East, was concerned almost wholly with administration and logistics. In these circumstances a separate theater communications zone headquarters would have been superfluous.

Overlapping in Korea

Perhaps more serious was the "layering" of logistical headquarters in Korea resulting from the establishment of a single section headquarters—Korea Base Section—under Korea Communications Zone Headquarters. It is true that the supervisory functions of KCOMZ were broader, including control of the 3d Military Railway Service and responsibilities for area administration, prisoners of war, and civil affairs. Yet in supply functions duplication of effort often appeared in practice between KCOMZ and Korea Base Section until, several months after the end of hostilities, the two headquarters were combined and subordinate area commands set up.

The attempt of the higher headquarters (KCOMZ) to restrict its activities to planning, policy making, and supervising proved to be impractical. On the other hand, Korea Base Section, which was supposed to be the operational headquarters for supply, found itself at a disadvantage in having the railroad under a separate headquarters.

A single headquarters with complete operational control of all facilities seemed to be more desirable for a communications zone not requiring two or more sections.

At the same time the soundness of the logistical command concept—the idea of having a headquarters organized under an approved table of organization and equipment for certain types of logistical missions—appeared to be well established.

Army Organization Sound

The logistical organization of the Department of the Army in the United States proved to be able to meet the shock of the Korean emergency with some expansion of personnel, but with only relatively minor readjustments in organizational structure. *This was a significant achievement. It was the first time that the Army's peacetime administrative machinery had been able to provide the essential services and supplies of a war situation without a far-reaching reorganization.*

In some ways the Army's service and supply organization still seemed to embrace too much red tape, to encourage too much duplication of effort, and to be too ponderous for speedy operation. Some officers and civil officials thought that greater efficiency would have been possible under a thoroughgoing reorganization. Others felt that an all-out mobilization would require a return to something like the Army Service Forces in World War II. But many were satisfied that the organization of G4 and the technical services which had been effective in peacetime and in the Korean emergency could serve as well in any future emergency.

Emphasis Shifting

The relatively smooth transition from peace to war of which it is capable is the factor which recommends the current organization in times when it seems likely that one emergency will follow another for a long time to come.

The entire field of administration and logistics was one in which the Army had been forced to excel in modern warfare. In the mid-20th century fighting was becoming, for the Army, secondary to administration. Becoming noticeable in World War II, this trend received further acceleration in the Korean conflict.

Combat Men in Minority

Much to their consternation, a great many old soldiers who longed for the smell of gunpowder and the chatter of machine-guns faced the more likely prospect of having to settle for the smell of mimeograph ink and the chatter of typewriters. Officers and men who felt they were contributing nothing to a war effort if they were not on the firing line had to develop a broader view of the requirements of modern war.

Most of the Army was not in the combat arms—the infantry, armor, and artillery; most of it was in the technical services—the engineers, quartermasters, medics, and chemical, signal, and transportation units, and in the administrative services and the headquarters which guided and supervised the tactical and service units from the combat zone to the Pentagon.

Now the Army's administrative and supply and service functions were not confined to the support of its own units; it also had broad responsibilities for supporting the other services—especially the Air Force, and in Korea the Marine Corps, and for executing the military aspects (and sometimes civilian aspects too) of the Government's Foreign Assistance Programs.

The Army was the executive agency for the Joint Chiefs of Staff for the Far East Command, a unified command; Army Forces, Far East, was executive agency for the commander in chief, Far East Command, in matters of logistics affecting more than one service. At the same time, the Army was the executive agency for the Joint Chiefs of Staff for the European Command, and it was executive agency for the Department of Defense for the Mutual Defense Assistance Program—the program for providing military equipment to allied nations around the world—and the Army was the agency for providing necessary logistical support for other members of the United Nations in Korea.

Learned Valuable Lessons

In the long run it was possible that the experience gained in supporting the other United Nations forces might provide the most valuable lessons of the whole conflict.

While the relative number of troops furnished by other members of the United Nations was small, and the supplies and services furnished them an almost

insignificant fraction of the total, the real significance of United Nations participation was not to be measured alone in terms of the numbers of troops involved. The problems of coordination, negotiation, and accounting were as great as if the troop contributions had been several times as large. It took about as much paperwork to record the disposition of 10 vehicles as of 100. Negotiations for concluding satisfactory agreements on financial arrangements were hardly less involved for the settlement of accounts amounting to a million dollars than for accounts of 100 million dollars.

Aside from the demonstration of solidarity for United Nations principles which the military contributions of the other nations indicated, probably the most important result of those contributions was the experience in international logistical cooperation which was likely to prove invaluable in any future collective police action or coalition war. While it was unlikely that any future allied military effort would adopt altogether the same policies as those applied in Korea, the very fact that some experience had been gained would provide at least some standard for planning where heretofore practically none was to be found.

Patterns for Future

Above all it might be expected that in the future serious consideration would be given to flexible methods of providing and financing military equipment for allies in wartime.

In 1950 a program of military assistance—the Mutual Defense Assistance Program—already was in operation. Its purpose presumably was to build up allied strength for more effective participation in a coalition war; yet procedures had not been worked out for continuing that assistance under conditions of the war against which the preparations were being made. As a result the Korean emergency had to be met with stopgap measures. It was possible that that experience would result in the development of procedures for a continuation of wartime matériel assistance which would be even more essential in some future emergency.

Many Americans felt a sense of disappointment in seeing the Korean conflict ended on terms less than total victory. But perhaps there was something even more important gained in this demonstration of restraint in the conduct of limited war for limited objectives. *In an age when total victory was associated with total destruction, perhaps it was more urgent than ever that total war be avoided as long as the national safety and essential freedoms were not sacrificed.*

Success Within Limits

Indeed that presumably was the objective of the whole United Nations effort in Korea. If the United States were engaged in a limited war in Korea in order to forestall a third world war, then that effort was successful—so far. If the United States were engaged in Korea in order to prevent the extension of Communist domination to South Korea, then that effort, too, was a success so far.

Korea was a part of a sequence of climactic events characterizing the entire worldwide struggle commonly referred to as the "cold war." The international tension between Communist states and the free world set Korea apart from earlier punitive expeditions of the United States. On many occasions the United States had supported armed intervention—from Tripoli to Mexico, and from Nicaragua to China—but seldom had those actions carried such overtones of high politics as were found in the Korean conflict. There the whole worldwide tension between the United States and the Soviet Union was thrown into sharp relief.

US Alerted to Danger

What probably was the most important result of the Korean conflict for the United States was that it served to alert Americans to the general danger of Communist attack at a time when they were looking hopefully toward trimming their defense expenditures and commitments for logistic support for allied nations. The Communist attack in Korea consequently set in motion a long-term rearmament program by which the United States would be made more nearly prepared to meet future emergencies, and particularly to accept total mobilization should that become necessary.

Actually, it was the Chinese Communist invasion in November and December 1950 rather than the original North Korean attack of the preceding June that was the more important stimulus to the rearmament program. After the Chinese intervention, the United States did face, as General MacArthur said, an entirely "new war." "Sino-American" War would have been a more appropriate name, probably, than "Korean conflict." It was only after the Chinese intervention that the President proclaimed a national emergency—largely for the benefit of logistical expansion—and that supplementary budgets began to be prepared on a scale commensurate with the total situation.

Important Decisions Made

A series of top-level decisions followed which had far-reaching consequences for the military position of the United States. All related really to the world situation rather than to Korea alone. The first of these was that *Korea must be regarded in a worldwide setting*—as the most emphatic warning of the threat of communism in the world at large—and that Europe, the potentially decisive area in an all-out war, must not be lost sight of. Accordingly, in the bigger and faster buildup which the Chinese attack touched off, the defense of Western Europe continued to hold a high priority. Indeed, because of the attacks in Korea reinforcements were sent to Europe.

A second major decision of the Army high command was that *matériel mobilization should take precedence over personnel mobilization*. Secretary of the Army Frank Pace, Jr., regarded matériel procurement as the controlling factor in the expansion of forces, and he resisted pressure to embark on a vast personnel mobilization program which might, in fact, retard matériel procurement and so military preparedness.

Creeping Mobilization

Another basic decision—actually a matter of national policy—was for "*creeping mobilization*" that is to say, industrial mobilization would be partial rather than total, and it would be accomplished with the least possible dislocation of the domestic economy. This was a decision based upon an assumption—shared by George C. Marshall and Robert A. Lovett, his successor as Secretary of Defense, and by Army officials—that world tension would continue for an indefinite time in the future. Too rapid industrial mobilization would invite the risks of obsolescence of weapons when they were most needed, and would make more difficult the maintenance of satisfactory matériel preparedness for the long pull against world tension which seemed to lie ahead.

This was an attempt to get away from what had been too frequently the American reaction of living from crisis to crisis with buildup and letdown. The policy of "creeping mobilization" represented an attempt to establish a plateau of preparedness which would furnish a more satisfactory continuity of strength with which to meet not only current threats but also those which would be certain to arise in the future.

Closely related to that policy was the further decision *to develop a broad industrial production base.* This put primary emphasis in the rebuilding of military strength upon long-term industrial mobilization aimed more at developing *capacity* to produce in great quantities than at immediate quantity production at the expense of greater capacity later. This decision was based upon the assumption that rapid industrial mobilization was the key to meeting emergency threats to the national security.

Keep Eyes on the Future

Under this policy orders for arms and equipment to support operations in Korea, and to build up stockpiles in Europe and the United States, were placed in such a way that long-range industrial preparedness would be best served. Smaller orders with several companies were favored over large orders with a single producer. Three production lines running on single shifts were preferred to a single production line running on three shifts because of the obvious advantage in expanding output quickly. This program required greater effort on the part of people administering it, and sometimes, perhaps, it was a little more costly, but Lovett and the officials of the Military Establishment working with him held to the firm conviction that such a policy was essential for the military preparedness of the United States.

"Creeping mobilization" and the broad production base probably were the fundamental logistical concepts of the Korean conflict. They shaped the whole war effort in treating Korea as a limited war while preparing for a total effort should that become necessary.

Budget Was Inadequate

Another decision, this one emanating from the Secretary of Defense over the opposition of the Army, had less fortunate consequences. This was the decision *to*

base the military budget guidelines on the assumption of an early termination of the conflict. In effect this meant that in preparing its regular annual budgets, the Army never could made allowance for supporting operations in Korea during the period for which the budget was being prepared.

Actually, the Army could only replace ammunition and other supplies already expended; it could not buy supplies for future expenditure. After-the-fact supplementary appropriations had to cover expenditures for operations in Korea. Not until 1953–54, as hostilities ended, did the budget catch up with the war. Perhaps these budgetary restrictions were a part of the price of limited war. Perhaps they were tribute to political realism in the circumstances. *But it seems likely that the industrial mobilization program might have benefited from a budget drawn in advance to support the Korean conflict. Such would have been more in keeping with the whole theory of long-term industrial preparedness.*

Striking a proper balance between economy and military preparedness always poses a most difficult problem. The unsatisfactory condition of American military preparedness at the time of the Korean attack undoubtedly can be traced in large part to the economy program begun in 1948. The *coup d'état* in Czechoslovakia in February 1948 had persuaded the President and defense officials to reverse, for a time, the postwar retrenchment, and then the Berlin blockade had added to the pressures for pushing a rearmament program. By autumn, however, the international situation supposedly had eased (even though the Berlin airlift was continuing) to the extent that the rearmament program first was leveled off, and then cut back.

Buildup Was Delayed

After President Truman, in March 1948, had directed Secretary of Defense James Forrestal to prepare supplementary budget estimates, the Joint Chiefs of Staff had indicated that a supplementary appropriation of 9 billion dollars was needed. This estimate had been based "solely on military considerations," and they recognized the need to phase the program in accordance with economic and political necessity. The result had been a supplemental appropriation of 3.481 billion dollars to bring the total Armed Forces budget for Fiscal Year 1949 to about 14.5 billion.

Forrestal and the Joint Chiefs then anticipated a buildup under which the total military budget would rise to 18.2 billion (or 20 billion dollars if prices continued to rise) by Fiscal Year 1952.

But the proposed buildup did not even get into its second phase. In the fall of 1948, when discussions began on the military budget for 1949–50, the President and the Bureau of the Budget imposed an arbitrary ceiling of 15 billion dollars on the defense budget for that year; in his budget message to Congress the President reduced this figure to 14.2 billion. At least this kept the military program about at the level to which it had been expanded in the preceding year. But the ensuing months saw a drive in the Defense Department to cut even that figure materially. *As a result the Korean conflict caught the United States Army in the midst of a fur-*

ther retrenchment program in which manpower was being cut drastically; depots, hospitals, and camps were being closed down, and procurement and maintenance programs were being curtailed.

Consistency Lacking

Sudden reversals, first of the earlier rearmament program, and then of the renewed retrenchment, were not calculated to encourage efficiency in either direction. It remained to be seen whether similar triumphs of economy over preparedness after the end of hostilities in Korea would undermine the plateau of preparedness which had come into being in response to the Korean conflict.

In still another sense the Korean conflict had worldwide logistical ramifications. While it is true that the attacks in Korea stimulated the sending of additional troops and supplies to Europe, it must be recognized that beyond a certain point Korea loomed as a competitor with Europe and other areas for what matériel resources were available. It was a repetition in a way of the World War II contest for resources between Europe and the Pacific. In this case the going war in Korea had some advantages over potential war in Europe, but the Truman administration consistently regarded Europe as the vital area in the world picture. Then what was essentially a question of high military strategy became ensnarled in domestic politics, and outstanding spokesmen appeared to support each cause.

More Emphasis on Asia

The Eisenhower administration never denied the vital importance of Western Europe in the world strategy against Communist expansion, but it did incline toward putting somewhat greater emphasis on Asia than had been the case earlier. One of the most outstanding examples of this new emphasis was the decision *to accept the full program of arming and equipping 20 divisions for the Republic of Korea Army.*

This, too, was a decision having worldwide implications. Since no plan for a corresponding increase in the procurement program accompanied it, the decision to expand the South Korean Army to 20 divisions amounted to denying that equipment for further building up European forces or for replenishing American reserve stocks. It meant that most of that equipment was likely to be tied down in Korea permanently, where it probably would not be available for use in emergencies in other parts of the world.

If peace remained stable during the next two years or so, the full implications of that decision for Europe and other areas probably would pass unnoticed. If hostilities should break out again in Korea, then it might appear as a most fortunate decision (unless the new outbreak turned out to be the result of an attack by the strengthened South Koreans). But the possibility of emergencies elsewhere could not be ignored. This decision, like so many military decisions by their very nature, belonged in the realm of "calculated risks"—although leaders were likely to disagree on what calculations should be taken into account.

Even the significance of the ammunition shortage was less a matter of concern for support of the Korean conflict than a significant element in the big picture. Ammunition, while frequently below that authorized, or even below safety levels in the theater, never was short on the battleline except on occasions when available transportation could not keep up with the rate of fire. The really dangerous situation which the expenditure of ammunition in Korea created was the depletion of reserve stocks in the United States. Again this meant more of a restriction on defenses in Europe and other areas than in Korea.

In this connection some question might be raised as to whether the tremendous outpouring of artillery ammunition recorded at various times in Korea really was necessary in all cases. The weakening of defenses in Europe and America was a high price to pay for repeated ploughing of Korean hillsides if there were any serious doubt that such heavy barrages were making an effective contribution to local tactical operations.

Logistical support of the Korean conflict had far-reaching consequences for the American position in the Far East, and it also had far-reaching consequences in the worldwide struggle against the spread of communism. *For the United States the Korean conflict was the second greatest of her wars from the standpoint of its logistical contributions. The best measure of success in that effort would be the extent to which it might help avoid a future conflict which might become the greatest war.*

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Amphibious Logistics—Inchon, September 1950

Introduction. Maj. Stanley L. Walker, a Transportation Corps officer, sketches the logistical aspects of General of the Army Douglas MacArthur's masterstroke during the Korean War, the amphibious invasion at Inchon in September 1950. Walker outlines the logistical organization for the invasion and focuses on the LOTS (Logistics Over-the-Shore) aspects of the amphibious assault on Inchon.

Thirty years ago U.S. Armed Forces successfully executed a major amphibious assault at Inchon, Korea, to halt a serious Communist offensive. Much has been written about General MacArthur's decision to strike at Inchon, the tactical aspects of the Inchon landing, and the capture of Seoul. The logistics support of this operation, however, has received only passing comments in books and periodicals. This examination of the logistics aspects of the Inchon-Seoul operation reveals the importance of logistics in the success of this amphibious assault.

The chronology of events leading up to the Inchon landing, 15 September 1950, is essential to understanding the planning and executing of logistics support. Beginning in June 1949, the American forces in Korea had been reduced to a Korean Military Advisory Group of 500 officers and enlisted men. In Japan, General MacArthur was the Commander-in-Chief, Far East, but he had no responsibility for the defense of Korea. Consequently, when the North Korean Army struck across the 38th parallel, 25 June 1950, there were no plans for rapid reinforcement and no existing logistics system on which to build a large supply and support complex necessary to prosecute a war.

President Harry S. Truman immediately authorized the introduction of U.S. troops. The 1st Cavalry Division, the 2d, 24th, and 25th Infantry Divisions, the 1st Marine Provisional Brigade, and the 5th Marine Regimental Combat Team arrived to defend what has become known as the Pusan Perimeter. Thus, the

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planning, preparation, and execution of the Inchon landing took place in less than 83 days.

Serious difficulties were encountered by General MacArthur and his staff in determining the troops to use for the amphibious assault. The first plan proposed by General MacArthur, Operation Bluehearts, died when the unit designated to make the assault landing, the 1st Cavalry Division, had to be committed to the Pusan Perimeter.

President Truman authorized the callup of the Marine Reserve in order to build up the 1st Marine Division at Camp Pendleton to wartime strength. The other unit designated was the 7th Infantry Division, which was refitting in Japan.

It was 12 August 1950, 33 days before 15 September, when the Far East Command issued Operation Plan 100–B, code name Chromite, designating the Inchon-Seoul area as the target for an invasion force. The headquarters to command the invasion force was X Corps, which was activated 26 August 1950, less than 20 days before the landing at Inchon.

The 1st Marine Division was comprised of the 1st Marine Provisional Brigade and the 5th Regimental Combat Team from Pusan and six Marine battalions formed from active duty Marine units in the continental United States (CONUS) and Mediterranean area and units of the organized reserve. The equipment for the Marine units organized at Camp Pendleton, near San Diego, came from the large Marine supply depot at Barstow, California.

Most of the equipment had been in storage for years and had to be reconditioned by 500 civilians. There was not enough time for the Marines to check out all of the equipment at Camp Pendleton, and some of it went directly to the docks at San Diego. The 1st Marine Division, minus the units in Korea, was administratively loaded and sailed from San Diego for Kobe, Japan, between 10 and 22 August, where they unloaded and reloaded tactically for the invasion. Neither the Marine nor the Army units were able to conduct any unit training before their departure for Inchon. However, the intelligence reports estimated enemy strength in the Inchon area to be only 1,500 to 2,500 troops, light resistance for almost 70,000 U.S. troops.

The X Corps sailed from Japan on schedule despite the interference of two typhoons, the continuing action in Korea, and the late arrival of an ammunition ship, which caused the assault troops to sail with only 20 percent of the planned ammunition load.

Gathering a fleet of 87 transport vessels had not been an easy task. Thirty of the 47 LST's (landing ship, tank) had to be obtained from the Japanese Government. The remaining 40 vessels were other types of transports furnished by the U.S. Navy.

Inchon was the worst place on the west coast of Korea to attempt an amphibious landing. General MacArthur's decision to land at Inchon was firmly based on the fact that it was the quickest way to Seoul, only 25 miles away, where most of Korea's main roads and rail lines converged. Capturing Seoul would disrupt the enemy lines of communication, enhance U.S. lines of communication, and secure a much-needed psychological victory.

The first major battle, however, would not be against the Communists but against nature, the battle to get ashore. The 32-foot tidal range at Inchon is among the greatest in the world. At low tide, the shore is lined with long, low mud flats that are impossible to cross. Therefore, the landings could only be made during periods of extremely high tides. These would occur for a few days in mid-September and again in mid-October. Additionally, each high tide would last only 3 hours and there would be 12 hours between the high tides. Landing craft, which could only travel about 8 to 10 knots per hour, would be hampered by 7- to 8-knot currents that accompanied the ebb and flow of the tide. Even the approach to Inchon through twisting Flying Fish Channel was a challenge to navigators. The channel was so narrow that one sunken vessel would block the entrance to Inchon. The tides also required the invasion fleet to negotiate the channel at night in order to arrive at Inchon at high tide.

Inchon Harbor is commanded by Wolmi Do (island). It was essential to capture this island before other landing operations could be attempted. The 3d Battalion, 5th Marines captured Wolmi Do on the first high tide and were left to fend for themselves until the second high tide late that afternoon. Subsequent assault landings were successful at Red Beach, north of Inchon, and Blue Beach, south of Inchon, that afternoon.

Logistics-over-the-shore (LOTS) operations were conducted at Green Beach, on Wolmi Do, and Red Beach, with only minor LOTS operations on Blue Beach. Red Beach was the scene of the most interesting aspect of the LOTS operations. All supplies for a 12-hour period, which would be during darkness, had to be on the beaches the evening of 15 September. Eight LST's carried the required supplies and support equipment, but they could not be beached, unloaded, and retracted before the tide went out since the evening tide only lasted about 3 hours.

A key decision insured the availability of critical supplies. The eight LST's were beached abreast for the entire duration of the low tide on Red Beach immediately after the assault troops landed. Each LST carried 100 tons of general supplies, 50 tons of ammunition, 35 tons of rations, and 15 tons of water. More than 450 vehicles were also carried aboard the LST's. The only serious hit on the LST was a mortar round, which ruptured fuel drums and caused gasoline to gush out. Quick reaction by the crew and a stroke of good luck saved the vessel and the cargo.

The eight LST's were unloaded at night by the 1st Shore Party Battalion (Marine), who used the burning brewery of Inchon for illumination. During the initial unloading, the key ingredient was speed, not organization. Normal dump locations could not be established immediately because the LST's had arrived on the heels of the assault troops, who had not had time to enlarge the beachhead. Initial ammunition supplies contained not only sufficient .30-caliber rounds, but also .22-caliber ammunition. This small error in loading can be attributed to the speed with which the supplies were pushed to the ports and loaded aboard the LST's in Japan.

Two of the LST's provided hospital support during the first night. They handled 95 wounded and there was only 1 death due to wounds. This was a tribute to

the naval medical organization and the decision to ground the LST's because evacuation to offshore vessels was not possible.

The next morning the eight LST's departed and eight more arrived, but two of the eight went aground on the mud flats too far out to be unloaded. However, this created no hardships ashore, because the initial eight LST's had solved the immediate supply problems.

On Blue Beach immediate supply requirements for the night of 15 September were met by 16 tracked landing vehicles. Since Blue Beach was not suited for LOTS operations, it was not developed beyond the initial assault requirements.

Although the Port of Inchon did not possess adequate facilities to handle the required tonnages for X Corps, the U.S. Forces found that the tidal basin could be made operational. The former Korean port director was located and he rounded up harbor pilots to guide vessels into Inchon. Port operations began much sooner than had been expected, and this expedited the unloading of supplies, equipment, and troops.

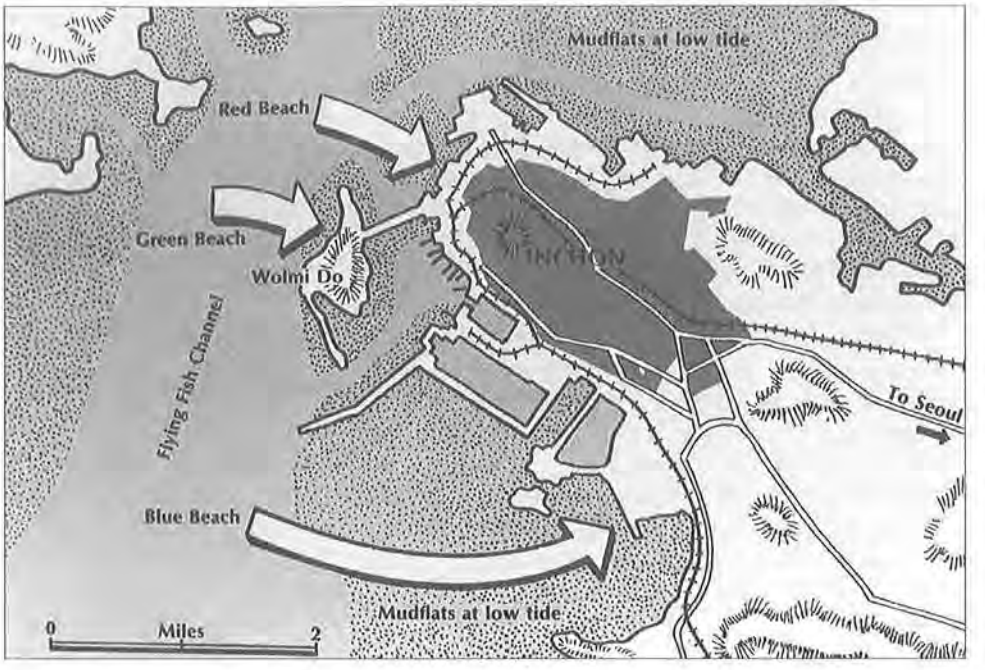
On 17 September, the 2d Engineer Special Brigade (Army) unloaded and assumed control of total port operations. Subordinate units included the 1st Combat Service Group (Marine), charged with control of consolidated supply dumps, the 7th Motor Transport Battalion (Marine), and the 1st Shore Party Battalion (Marine), responsible for unloading the ships.

On D+2, 17 September, Red Beach was closed and all unloading was done at Green Beach and Pier 2. Beach personnel from Blue Beach were transferred to Green Beach, where facilities for unloading LST's had been improved on D+1. Supplies and equipment moved across the causeway from Green Beach to Inchon.

The use of the Port of Inchon by D+2 was possible because U.S. air and naval fire inflicted limited damage on key facilities. Special orders had been issued not to attack or destroy such targets as the tidal basin locks, inner harbor piers, the causeway connecting Wolmi Do and Inchon, and the finger pier at the western tip of Wolmi Do. Pilots were instructed not to use any ordnance heavier than rockets on the seawall immediately north of the causeway. Plans called for 16,000 tons to be unloaded by 23 September, but by that time, 24,000 had been unloaded. By 22 September, more than 6,000 vehicles and 53,000 troops had been unloaded at Inchon.

There were two Marine motor transport units with the assault troops. Plans called for the 2d Engineer Special Brigade, an Army element, to head a logistics organization that also included several Marine units: the 1st Shore Party Battalion, the 1st Combat Service Group, and the 7th Motor Transport Battalion. Apparently the 7th Motor Transport Battalion was scheduled to assist in port operations and clearance.

The X Corps was accused of creating a shortage of motor transport by failing to provide sufficient trucks to clear the port and by taking the 7th Motor Transport Battalion from the Marines to solve this problem. By whatever means, there were 205 trucks available for port clearance, 168 of which were from the Marines and 37 from the Army. Another possibility is that the 1st Marine Division had the 7th Motor Transport Battalion to provide the motor transport required for extended



Invasion routes to Inchon, 15 September 1950

land warfare. However, X Corps was short of trucks and had to retain the 7th Motor Transport Battalion for port clearance throughout the operation.

The truck shortage was alleviated somewhat by the rapid repair of the rail system. Use of the railroad was anticipated by D+30, but on D+1 a switch engine and six cars were operating in the Inchon railyard. Three days later, 19 September, 1,200 Marines were moved from Inchon to ASCOM (Army Service Command) City, 5 miles away. The availability of Korean crews and minimal damage to the rail equipment made this possible. By 26 September, the railroad had moved 350,000 rations, 315,000 gallons of fuel, 1,260 tons of ammunition, and 10,000 troops.

Kimpo airfield was captured 17 September. The Far East Air Force Cargo Command flew in most of the ammunition and fuel to support air operations. About 400 tons of cargo were handled daily at Kimpo. This airhead was particularly important for the rapid supply of repair parts and other urgently needed items.

By 26 September, the 8th U.S. Army and X Corps had joined at Suwon, and Seoul was under U.S. control. This was the end of the Inchon-Seoul operation.

The Inchon landing involved many uncertainties including availability of forces, knowledge of the enemy, hydrographic and topographic conditions—but not logistics. The logistics support of the Inchon-Seoul operation was particularly good in view of the short time in which the entire invasion was conceived and executed. An amphibious operation usually requires 90 to 120 days to plan, mount,

rehearse, and execute. This operation was conceived, planned, and executed between 12 August and 15 September 1950, a total of 33 days.

There were only two materiel shortages—trucks and bridging. The X Corps planners have been cited for not having sufficient quantities of these two items. This seems to be a shortsighted analysis. Perhaps the items were either not available at all or not available in time for the landing. Perhaps the shortage of ships dictated that trucks and bridging would not be shipped in lieu of more essential items. In the case of motor transport shortage, available trucks might have been put to better use if both Marine motor transport battalions had been assigned to the 2d Engineer Brigade for centralized control.

The limited sites for LOTS operations and the shortage of trucks prompted planning for the use of indigenous port facilities and railroads. This foresight greatly contributed to the fast unloading and forward movement of supplies, equipment, and troops. Had plans been prepared before 1950 for the reinforcement of Korea, including the use of indigenous transportation capabilities, a better mix of organic assets and indigenous assets could have evolved.

The success of the Inchon-Seoul operation cannot be attributed solely to excellent logistics support. Nor can any other single element involved in the operation be identified as the guarantor of victory. Logistics, however, did play a significant role and, if it had not been so well planned and executed, could have been the cause of defeat.

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Logistical Support of the 24th Infantry Division in Korea

Introduction. In this study prepared for the course in the history of U.S. Army logistics at the Command and General Staff College, Maj. David F. Tosch examines from a theater perspective the logistical support of the 24th Infantry Division during its first and last ninety days in Korea. He draws the parallels of the 24th Infantry Division's experience in Korea with the types of logistical problems which are likely to be encountered in support of forces in limited war operations in the future.

The purpose of this paper is to compare and contrast the sustainment the 24th Infantry Division from July through September 1950 and at the defense of the 38th Parallel during the three months preceding the Armistice of the Korean War. Logistic support during these two periods differed greatly and today serves as an example of how sustainability of combat forces changes over the course of a conflict. Although some of the lessons learned have been embodied within the current logistics doctrine and structure, many of the methods resorted to remain relevant. This is important as there is a high probability that American combat forces will have to operate in an austere environment on very short notice—a scenario not unlike that of the Korean War. As a result, it behooves all logisticians and combat planners to study, for future application, how the logistics effort was undertaken. Even though numerous improvements have been made in logistics systems we will never have all that we desire in the way of resources, it's a reality that we must face. My premise is that the outcome of future conflicts will be based on how logisticians overcome the shortfalls inherent in an austere environment. The Korean War serves as an excellent example of how this can be done.

Within the scope of this paper I will analyze how the 24th ID was sustained during the initial stage of the conflict by focusing on what the logistic planners and

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Reproduced from David F. Tosch, "Sustainment of the 24th Infantry Division in the Korean War: First 90 Days vs. Last 90 Days," Student Paper for the Course on the History of U. S. Army Logistics (Fort Leavenworth, Kans.: U.S. Army Command and General Staff College, 21 May 1986).

operators in the theater did. Specifically, what decisions were made, who made them, the results attained, and the extraordinary steps taken to support the combat forces. Also, the analysis will necessarily focus on supply and transportation. Although maintenance and medical support were important they did not have as much of an impact on operations as supply and transportation. The second portion of the paper will examine the decisions made in a mature theater and determine what factors influenced a typical combat division such as the 24th ID while in a static defense. I will conclude with a discussion of the lessons learned.

First 90 Days

The 24th ID was a typical Triangular Division which, on paper at least, was a World War II Infantry Division. Although, the full strength of the division was 17,752 by TO&E, it was a skeletonized unit with many of the essential combat elements assigned to corps or army pools. For example, the division tank battalion was removed as was the air defense battalion. Also, the standard three battalion regiments were reduced to two. The division trains was small compared to today's standards, however, each regiment had a Regimental Service Company that contained adequate transportation and supply support.[1]

Upon the outbreak of the war it only took five days for Washington to decide on sending U.S. ground troops to Korea. On 30 June, 8th Army was directed to dispatch a holding force from the 24th ID. Identified as TF Smith, this element consisted of two companies of the 21st Infantry with some added firepower. 24th ID received its mission on 1 July:

> Move delaying force of 2 rifle companies, under battalion commander, augmenteed by 2 4.2 platoons, 1 75mm recoilless rifle platoon, and 6 bazooka teams by air on 1 July to Pusan reporting to General Church for orders. Move Division HQ(-) and 1 infantry battalion to Pusan by air at once. Move remainder of division by water to Pusan at once.
>
> Advance at once upon landing with delaying force, in accordance with situation, to the north by all possible means, contact enemy advancing south from Seoul towards Suwon and delay his advance.[2]

All units of 24th ID were to be brought up to TO&E strength by 8th Army except the air transported units which were to be brought up to strength with personnel presently available in 24th ID. 2,062 EM and 46 officers were drawn from other 8th Army units.[3] Considerable reshuffling within the units resulted as the other divisions in the theater were also short of personnel. In order to sustain itself initially the 24th ID was directed to insure the following: air transported units were to carry a basic load of ammunition and three days rations; the remainder of division units were to carry 15 DOFS (Days of Supply) in class I, II, III, and IV (5 DOFS were to be carried with troops and 10 with the division trains), and 2 basic loads of Class V. Automatic resupply would begin on the 15th day from Japan. TF Smith departed Japan on 1 July with 900 men and 50 vehicles, the remainder(100

men and 79 vehicles) departed 2 July. After arriving at Pusan TF Smith was transported by rail toward Taejon arriving there at 0700 on 2 July. The remainder of the 21st Infantry sailed from Japan on 3 July. On 8 July the division trains and attached support units departed Japan for Pusan by surface ship.[4]

Because no logistic plan existed for a Korean operation, logistic decisions were made on an ad hoc basis. On 29 June the G–4s of 8th Army and GHQ, FEC (Far East Command) met at a conference which began developing operating policies:

> 1. Begin planning immediately to turn over to 8th Army the complete mission of logistic support for the Korean operation once the present situation straightens out. 8th Army will then become responsible for getting supplies from depot stocks to the ports and airfields. The responsibility for transportation to Korea will be that of the Navy and Air Force.
>
> 2. A logistic base must be established somewhere in Korea which will handle all incoming supplies.
>
> 3. The supply posture in Japan should not be jeopardized by depleting the 45 day reserve. The reserve should be increased to 120 days.
>
> 4. Until the situation clears, operations should be conducted as in the past with GHQ, FEC making the decisions on what should be released from depots. 5

Command and control responsibilities were obscure from the beginning. A controversy arose over a fully loaded ship routed for Manilla which was pulled into Japan and off-loaded so it could be used in support of the Korean operation. GHQ, FEC informed 8th Army that the ship must continue to Manilla with its load. However, the G–4 8th Army informed everyone at the port and depots that orders would only be taken from command channels not technical channels. By 27 June one ship was loaded with 1,636 long tons of ammunition and 12 105mm howitzers. Also, on the 28th, 119 tons of 105mm ammunition was air delivered to Pusan. [6] Although much of this ammunition would be expended by the ROK Army it would also be used to sustain the 24th ID and the other deploying divisions.

Several 8th Army logistic units, including Quartermaster, Transportation, Ordnance and Medical companies were attached to the 24th ID (see table 1). However, the units had to be filled with personnel drawn from depots and other logistic units located in Japan. Also an urgent request was made to Department of the Army for several other logistic units and by 30 June many had been alerted for movement to Korea. It was realized as early as 1 July that additional truck transportation would be needed to support the 24th ID as its combat elements were initially stretched from Osan to Pusan, a distance of over 200 miles. The 70th Truck Battalion and 541st Truck Company were to be deployed immediately from Japan with full TO&E. As a result, these units arrived at Pusan on 8 July prior to a portion of the division trains (24th QM and OD companies).[7]

The Pusan port was in dire need of supervisory personnel and manual labor, and although they were not equipped or manned to do so, the 24th ID would have to take care of both the port and their own logistic support until personnel could be provided from other sources. In early July, 8th Army alerted 28 officers and 98 enlisted men for movement to Korea to operate the port and a similar number to assist the railroad operation. However, the first ship was scheduled to arrive at Pusan from Japan on 1 July and was unloaded by 24th ID personnel. The situation was so critical that the Navy had to be notified to freeze the cargo until personnel from the 24th ID could get to Pusan and supervise the unloading. On 2 July the G–4 24th ID made arrangements to get port operators to Pusan by air on 3 July and expedite the Pusan port operations.[8]

TABLE 1—SUPPORTING UNITS ACCOMPANYING 24TH ID

	Personnel	Vehicles
Engineers	1,130	364
Medical	494	97
Ordnance	614	305
Transportation	850	568
Mil Police	219	68
Signal	443	196
Quartermaster	486	119
Total	4,236	1,717

Source: US Army, HQ Eighth Army *Eighth Army War Diary, Section I: Prologue, 25 June 1950–12 July 1950*, 1 August 1950, p. vi.

As soon as the 24th ID began re-equipping itself, in order to fill its extensive shortages, normal requisitioning and issue procedures were immediately cast aside. Due to the urgency of the situation there was no time to fill out paperwork or post stock records in most cases. Because the ammunition depots in Japan were under the control of the tactical commanders of the areas in which they were located, 8th Army's control over ammunition was next to impossible. For example, when the 24th ID deployed it cleaned out the two ammunition depots in its area which together held over 21,000 tons. Not until several days later, when the 1st Cavalry Division was alerted to draw ammunition at the same depots, was it discovered what had happened[9]. Also, because combat accountability was placed in effect for all units deploying to Korea the situation was further confused.

Until a central requisitioning agency could be established in Korea a system of automatic-resupply from Japan had to be implemented. Using WW II consumption factors (1 measurement ton per man per 15 days), 15 day increments were identified, stocked in Japan, and shipped to Pusan on a scheduled basis. After 8th Army's stocks had been drawn down, during the initial surge, immediate requisitions were placed on CONUS to replace and provide additional stocks based on Korean consumption rates. Difficulties were encountered in determining the basis upon which to requisition because of the fluctuation of planning strengths and units and resulting in duplication. For example, almost 1,000 tanks, enough

for the 8th Army's full TO&E, were requisitioned at one time.[10] Due to the limited stocks in Japan, Department of the Army was requested to insure that each unit departing CONUS was provided with 60 days supply of all classes (less class III) and that each deployed unit was followed by 60 days automatic resupply. Much of this equipment began arriving by the end of July, but perhaps the most dramatic example of the timely arrival of supplies from CONUS was the first shipment of 3.5 rockets. The 24th ID was unable to obtain these prior to leaving Japan as there were none within the FEC. As a result, an urgent request was sent to CONUS and the first shipment was received on 12 July.[11] However, much of the needed equipment did not arrive early in July and local procurement was used to obtain such items as sandbags, landing net clips, manila rope, crushed rock and pallets.

Air resupply of the 24th ID began on 3 July when 24.5 tons of rations were airlifted to Pusan. Airlift shipments were to play a key role; for example, on 6 July three C–47 loads of priority cargo were delivered at Taejon and twelve at Pusan.[12] The sustainment of the first division to enter Korea was beginning to take shape during the first week in July. In addition to the 15 day increments of automatic-resupply being transported by ship from Japan, bundles with sufficient supplies to sustain infantry battalions for one day in battle were put together and more than 100 of these were airlifted to Korea during the first two months of the campaign. In addition, over 100 air drops of this materiel were made from Japan during this same period.[13] With all this activity it was impossible to tell how much resupplying had been done during the first two months; and it was estimated that the 24th ID had received its entire TO&E twice over.[14]

Initially, supply requirements were telegraphed by the division to the Pusan Base Section under 8th Army. Due to the long distances involved and poor roads, supplies were "pushed" forward by rail to the division railhead. Because of the limited facilities at the railheads indigenous labor was used to unload and physically carry supplies forward to the combat units. Later in July one railhead located at Masan, 35 miles west of Pusan, was unable to keep its inadequate marshalling yard open to receive supplies for the 24th ID. This was because the division was withdrawing and kept forcing equipment and supplies, directed to go forward, back into the yard. The 24th ID, due to the fluid combat situation, tried to leave as much of its heavy equipment on flat cars as it withdrew. However, the lack of marshalling space and resulting congestion at the railhead prevented the holding of rail cars for storage purposes. Complicating matters were the field grade officers from the Pusan Base Section who were "expediting," the commodities they were responsible for, by being present at the marshalling area trying to insure "their" supplies were pushed forward first. As a result, intermediate railheads, such as Taegu, were being swamped with supplies being evacuated, and with those sent forward by the staff officers at Pusan. Once the problem was elevated to the Commander of the Pusan Base Section a control system was established to determine on a daily basis how many tons could be moved to a particular point. Coordination was then made with each of the technical service staff officers and a train load was tailored to fit the requirements. Also, for added insurance, clearance from the Base Section was necessary before the train moved.[15]

General Walker was appointed Commander of U.S. Forces in Korea on 6 July which included the responsibility for all logistic activities. The Pusan Base Section was established to manage the logistic effort. Because 8th Army realized that it was impossible to determine the status of ammunition supply, one of its first actions was to obtain a more complete picture. The Commander of the Pusan Base Section was requested to keep 8th Army advised of all ammunition shipments forward. In addition, all divisions were directed to furnish 8th Army a daily ammunition status report. To assist in controlling the flow of ammunition and accountability, a depot was established at Taegu on 13 July and was operated by an Ordance [*sic*] Ammunition Company. As a result, on 15 July 8th Army diverted all ammunition ships from CONUS, scheduled for Japan, to Pusan.[16]

A Quartermaster Supply Company arrived in Taegu on 12 July to operate the 8th Army Class I and III Supply Point. A shortage of combat rations resulted in a directive to all commanders to issue combat rations in forward areas only. All remaining combat rations in rear areas were ordered to be turned into Class I points. At the end of July the 8th Army Quartermaster reported that, from the experience he had gained so far, it was obvious supply personnel had not been trained to act independently when separated from their parent unit. As a result, it was felt that supply operations were in need of constant supervision by experienced staff personnel to ensure that rations and other supplies were properly distributed to the units. Part of this problem can be attributed to actions designed to get more personnel into combat units. "Operation Flushout" began in late August and "Operation Squeezeout" was initiated in early September resulting in the reclassification of over 2,500 service unit personnel to combat arms branches further reducing logistics capability.[17]

Command and control arrangements for logistic organizations remained a problem area during the initial months. First on 25 August, in order to releive [*sic*] the CG 8th Army of the responsibility and functions normally associated with a Communications Zone (COMMZ), the Japan Logistical Command (JLC) was established as a subordinate command of the FEC and the Pusan Base Command remained an 8th Army supply point. Then on 19 September the Pusan Base Command became the 2d Logistics Command. More than just a change in names, this provided the solution that would allow 8th Army to control its own base area. The doctrine for this concept of an Army controlling the logistics resources in support of its operations was already being taught at the Command and General Staff College and was now being tested for the first time.[18] Another command and control enhancement that was instituted early in the war was the establishment of the Coordinator for Protection of Lines of Communication. Its mission was to coordinate the efforts of both the Korean and U.S. Military Police in providing the maximum protection of roads, railways, bridges and communication sites against sabotage and guerrilla activity. This organization was also responsible for stemming the flow of refugees to the south, security of the Main Supply Route and assisting the local police to counter guerrillas.

Although extraordinary efforts were required, the 24th ID and the other combat forces introduced to combat during the first 90 days were well supported logis-

tically—any logistic shortfalls that did occur did not affect operations. In fact there were several cases where supplies were in overabundance—particularly ammunition. During the first several months ammunition was arriving in great quantities from CONUS. At the same time there were substantial amounts of ammunition of most types in Japan. The continued shipments from CONUS resulted in the arrival of more than 200,000 tons of ammunition in excess of Korean requirements. Things got so bad at one point that a shipload of 105mm ammunition, enroute to Japan, was almost turned around to CONUS because of a lack of storage space. [19] In addition, due to the inadequacies of port and storage facilities in Korea, many shipments of supplies originally ordered for direct delivery to Korea had to be diverted to Japan in order to prevent the choking of port facilities in Korea. Supplies were in abundance during the early period of the conflict and intensive management efforts were employed to get them to the right place. Largely due to these factors combat operations were well supported during the early stages.

Last 90 Days

During 1951 an effective logistics infrastructure was developed which permitted a constant flow of supplies and ensured that they were located close enough to the front to permit a rapid buildup for both offensive and defensive tactics. This logistic system was maintained throughout the remainder of the conflict, having much to do with logistic effectiveness just prior to the armistice in mid-1953. Although the logistics infrastructure, during the closing months, was well established and functioning in a developed theater, controversy remained over how the logistic system should be managed. Senior logisticians were concerned over whether the 8th Army as a tactical command should have command and control of the 2d Logistical Command. Most logisticians felt that proper supply management demanded a COMMZ organization separate from the tactical organization. Otherwise, they argued, it would be difficult to control levels of supply, to plan requirements, and to manage the system, as long as the major logistical command (Japan Logistical Command—COMMZ) had no control over a substantial portion of the stocks in support of the combat elements. Even though there was much preoccupation with this organization issue it had little affect on combat operations.

In 1951 the authorized level of supply in Korea was reduced from 30 to 15 Days of Supply for most items. Much of this was due to the problem of shipments exceeding port capacities. The CG, JLC felt that oversupply was a continuing problem that carried on from the initial days of the conflict. Because over-supply generated excessive demands on shipping and other transport, requirements for extra storage facilities, and additional personnel to handle and guard them, improved management of resources was critical. Senior leadership believed that drastic measures had to be undertaken by reducing storage and supply levels, implementing supply economy training, and increasing efficiency in the supply system. It was also recognized that such measures had to be implemented without creating a fear that the flow of supplies would be interfered with, otherwise there would be a tendency for hoarding in the units. There were many indications that these conserva-

tion measures had taken hold prior to the end of the conflict. In a report by an Army Field Forces Observer Team in late 1952 it was noted in many instances where supply economy and cost consciousness were being practiced in the divisions. Signs, posters and slogans were observed throughout the forward areas as well as the rear areas. In some instances, the U.S. prices of supplies and equipment had been converted to Korean costs by estimating transportation and handling expenses of getting the items from CONUS to the forward areas of Korea. Moreover, all officers in G–4, 8th Army were required to make one visit per month to army units for purposes of checking the effectiveness of supply economy programs.[20]

Of all the classes of supply ammunition remained the only continuing problem for logistic planners. During the early months of 1953 only 27% of the Class V programmed for shipment was actually shipped from Japan to Korea due to reduced expenditures. Department of the Army also revised ammunition requisitioning and resupply procedures due to a reduction in combat ammunition consumption as a result of truce negotiations in Korea. The new stockage levels were to be based on the past 120 days of actual expenditures except for certain items that had very low expenditure rates. The CINC, FEC did not agree with the reduction and felt that procedures should remain in effect so that enough ammunition would be available if expenditures suddenly increased[;] however, he was overruled by Department of the Army. Later, in early 1953 ammunition stockage levels became critical in some types, particularly artillery, and was hardly enough in any type. During May stock levels of the three most commonly used types of large caliber ammunition were all below the authorized level for Korea which was 90 DOFS. Another indication of a preoccupation with non-readiness aspects was that in the spring of 1953 the scheduled lumber shipments to Korea far exceeded the unloading capacity of the Korea ports. However, the KCOMMZ beleived [*sic*] it could all be off loaded by using a combination of ports and unloading on beaches.[21] With rotation as a carrot dangling before his eyes, the individual soldier's main concern was to stay alive until his year of combat service expired. After armistice negotiations began, 8th Army maintained strict control of operations in an effort to avoid casualties in the hope a truce would be signed. This lack of aggressiveness filtered down through the ranks and neither officers nor enlisted men were particularly interested in taking chances. An aura of caution and complacency had much to do with the building of facilities and infrastructure to make the environment more accomodating [*sic*]. This in turn had a significant impact upon the efficiency and responsiveness of the logistic system. An excellent example of this was that the divisions were restricted in the expenditure of ammunition during the waning days of the war.

Conclusion and Lessons Learned

Probably the most significant hurdle that had to be overcome was the establishment of an effective logistic command and control system. Initially logistic units had to be introduced in a piecemeal fashion with little unit integrity even at the company level. Support commands did not exist during this period and it took

several years for an effective logistic infrastructure to evolve. The fact that no logistic plan existed had much to do with the lack of preparedness during the early stages of the conflict. Part of this can be attributed to the separation of the technical service branches from normal command channels. 8th Army looked upon the FEC as members of the technical services having no command authority. Since most of the senior logisticians resided at GHQ, FEC they did not have much involvement in 8th Army logistic decisions. Today's logistic organizations have been structured for the most part in recognition of these shortcomings and are much improved in command and control systems. It is important that logistic planners play an active role in all preparations[;] however, organizational structures alone do not assure that this participation will take place[.] The senior leadership must insure it happens.

The loss of supply accountability as soon as the deployment from Japan began, impacted greatly on subsequent support. Similar problems occurred at Normandy in WW II. However, in Korea conditions were much more austere and sustainment efforts could have been substantially improved if accurate accountability was maintained. This experience, as a lesson learned, was not heeded because in Vietnam supply accountability was disastrous in terms of waste. The excesses enjoyed in Vietnam and even Korea provided the necessary slack to overcome an inefficient system[;] however, future conflicts will most likely be characterized by austere logistics and limited resources. If this is the case, accountability of supplies will be critical to successful combat sustainability. Automation has done much to improve this shortcoming, however it also requires well trained logisticians to make any system function properly—especially when the automation ceases to function. Moreover, if logistics is to be recognized as important to combat operations then emphasis must be placed upon proper training and then retaining a nucleus of logisticians to maintain consistency. It is important that logisticians are not reclassified into the combat arms on the eve of a war as was done during the Korean conflict. Provisions must be made to obtain infantrymen from other sources and ensure they are available for early deployment.

Because supplies poured into the theater haphazardly during the first year excessive supply levels developed. This carried on for the remainder of the war as storage capability was filled to capacity most of the time. However[,] much of this materiel was not the most critical and merely got in the way of expediting the high priority materiel. This became a burden on the logistic pipeline and slowed operations as excessive demands were imposed on the shipping, air, and rail modes of transportation. Extra storage space was sought throughout the conflict but could never meet the demand. This problem of having excess supplies on hand was further compounded by the lack of supply accountability and untrained logistics personnel as discussed above. Subsequently, the senior leadership became concerned with conservation measures and initiatives to improve supply accountability, especially during the last year of the conflict. During this time emphasis was diverted from sustainment of the war effort to attempting to gain control of supplies. I believe that this is a good example of how the army lost its focus during the last year or two of the war.

The senior leadership cannot afford to lose their focus on war fighting during a conflict. When other priorities are established that do not contribute directly to combat operations then the effectiveness of the army is diminished. Many would argue that the army had to get a handle on supply accountability in order to adequately support the war and that command emphasis was necessary to get it done. However, the leadership has to be careful that the sustainment effort is not disrupted in doing so. There is a delicate balance in changing priorities while conducting a war, soldiers will put their efforts into the areas that are being emphasized while other critical areas may be neglected. Political aspects weigh heavily in this and the army must submit to the decisions made in the political arena. Nevertheless, the senior army leadership must provide a focus that is unwavering and insure that other priorities do not get in the way, all within the political framework.

The final area I will address is an obvious one—the criticality of air lift. In order to overcome the lack of prior logistic planning and shortcomings in the logistic system, air lift was used extensively in the Korean War. This asset is particularly necessary in an undeveloped theater of operations where roads and railways may not even exist. Although there were adequate railways in Korea the Lines of Communication were very long and during the initial stages there was insufficient time to get supplies from Pusan to Osan. As a result, air lift became the only means to get adequate equipment, ammunition, and food to the forward elements on a short notice basis. Even later in the war, combat operations were not impacted by supply shortages because air lift was routinely used to meet requirements on extremely short notice.

In summary, the Korean War stands today as an excellent example of how combat operations are sustained in an undeveloped theater. Although significant shortcomings had to be overcome the sustainment effort was successful. Much of this can be attributed to the extensive resources available in Japan at the outbreak of the war. Future limited wars will more than likely have to be supported with constrained resources; and, extensive stockpiles from which to draw ammunition and other supplies simply do not exist. It therefore is extremely critical to learn from our past mistakes and to do everything possible prior to the outbreak of war to assure that adequate sustainment capability exists.

Notes

[1] US Army, Field Manual 7–30, *Service and Medical Companies, Infantry Regiment*, September 1949 (Washington, DC: Government Printing Office, 1949), pp. 82–98.
[2] US Army, HQ Eighth Army, *Eighth Army War Diary, Section I: Prologue, 25 June 1950–12 July 1950*, 1 August 1950, p. ix.
[3] Ibid.
[4] Ibid., pp. xii–xiii.
[5] US Army, HQ Eighth Army, *G–4 Unit History, 25 June–30 June 1950*, 12 July 1950, p. 6.
[6] Ibid., p. 4
[7] US Army, HQ Eighth Army, *G–4 Unit History, 1 July–12 July 1950*, 1 August 1950, p. 2.
[8] Ibid., p. 3.
[9] Ibid., p. 5.
[10] US Army, HQ Eighth Amy, *G–4 Supply Division Report*, 31 August 1950, p. 2.
[11] Eighth Army, *G–4 Unit History*, p. 8.
[12] Ibid., p. 4.
[13] US Army, HQ Eighth Army, *Eighth Army War Diary, Section II: Summary, 1 August–30 August 1950*, 14 September 1950, p. 7.
[14] US Army, HQ Japan Logistical Command, *Japan Logistical Command Activities Report, 25 August–30 September 1950*, 16 October 1950, p. 21.
[15] John G. Westover, CPT(Ret), *US Army Combat Support in Korea* (Washington, DC: Combat Forces Press, 1955), pp. 60–61.
[16] *Eighth Army War Diary, Summary*, p. 9.
[17] *Japan Logistical Command Activities Report*, p. 17.
[18] Ibid., p. 26.
[19] Ibid., p. 13.
[20] US Army, Field Forces Observer Team No. 7, *Report of Army Field Forces Observer Team No. 7 to the Far East Command, October–November 1952*, 2 December 1952, p. 8.
[21] US Army, HQ Japan Logistical Command, *Japan Logistical Command Activities Report, May 1952–April 1953*, 21 May 1953, p. 28.

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Transportation Truck Operations in Korea

Introduction. Lt. (later Col.) Alfred J. Catania relates his recollections of the operations of the 377th Transportation Truck Company in Korea in 1950. He describes port clearance operations at Inchon, convoy operations between Wonsan and Hamhung, and convoy ambush/defense operations near Koto-ri. His eyewitness account provides a good insight to highway operations at the company/battalion level during the Korean War.

Late in July 1950 a telegram cut short my leave and returned me to Fort Sill. There I found my unit, the 377th Transportation Truck Company, was on overseas alert.

Our assigned men were well trained, for we had completed an exercise only four months before. The training and capability of our replacements was still unknown. As we received new vehicles we ran them through our company motor shop, then through post ordnance, which prepared them for overseas shipment. Trailers were then loaded on and strapped to the beds of the trucks, and the trucks were loaded onto flatcars. This shipment preceded the company and was not seen again until after we arrived in Japan.

We landed at Yokohama on 28 August and were temporarily attached to Yokohama Motor Command. A few days later we received notice that some of our trucks had arrived at the port. It took some ten days to get all our vehicles since they came in several vessels and were unloaded at different piers.

While our vehicles were arriving in driblets we were warned to stand ready to load on one day's notice. This brought about confusion, as we had to requisition equipment from Yokohama Motor Command, and in most cases our own equipment arrived in time to be loaded. Inventories, overages, turn-ins, and paper work resulted.

Reproduced from Alfred J. Catania, "Truck Platoon in Korea," in John G. Westover, ed., *Combat Support in Korea* (Washington, D.C.: U.S. Army Center of Military History, 1987), pp. 49–57.

While at Yokohama all our vehicles were put into running condition and combat-loaded. During the second week of September our personnel boarded a transport, and on about D plus 8 they were unloaded at Inchon. The next day our vehicles arrived and were put to work.

The beaches at Inchon were piled high with equipment. We hauled supplies over the causeway from Wolmi-do, from the beaches, and from shipside in the tidal basin. Our trucks operated around the clock. Each truck had two assigned drivers, and each worked a twelve-hour shift. The demand for transportation was so great that we did not have time to perform second-echelon maintenance. First-echelon maintenance was performed at the loading or unloading points, while the drivers waited in line. The company wrecker was posted near the tidal basin where all of our trucks had to pass. It carried parts and lubricants, and had two mechanics waiting to make emergency repairs and fix flat tires.

At Inchon we joined several newly arrived truck companies to form the 52d Transportation Truck Battalion. One day in mid-October, however, our company was relieved from the tidal basin haul at 1900, and departed for Pusan at 0200 the following morning. We were loaded with troops and equipment and made the forced march of 350 miles in about 36 hours. Every vehicle made it under its own power. We ran into sporadic enemy fire north of Taegu several times, but all vehicles kept moving and sustained no damage.

At Pusan the company had time to do some needed maintenance work. We left our trucks loaded and ready for movement to the transports. But orders were changed. We had to unload our cargo, haul troops, then reload and drive to dockside. This kept us plenty busy for the five days at Pusan.

Once on board the transports we lay at anchor some nine or ten days before we steamed to Wonsan, in North Korea, where we landed on 1 November 1950. The trucks were transferred to LSTs by the ships' gear, and some were damaged, since the transfer was made in heavy seas.

Our first mission ashore was to deliver the cargo in our vehicles. This included 37 truckloads to the 121st Evacuation Hospital at Hamhung, some 75 miles northeast. When we applied for road clearance, X Corps directed us to keep the vehicles in the Wonsan area as the enemy had set up a roadblock fifteen miles north. Marines cleared the road, and the next day we drove to Hamhung. We returned the following day, and the Wonsan-Hamhung run became our regular route.

Just before midnight of 5 November, the company was ordered to furnish an officer, a driver, and a jeep to the transportation officer of X Corps at 0600 next morning. I received the assignment. I reported and was informed I would be the commander of a convoy assembling at 0700 to move part of the 65th Infantry from Wonsan to Yonghung, about forty miles north. I was to control forty-six vehicles assembled from various corps units. I met my vehicles and at the same time reported to the CO of the 65th Infantry. He took the vehicles, parceled them out to his battalions and companies, and I had nothing more to do than follow the convoy and return the trucks when the march was over. The convoy left Wonsan at 0930 but did not arrive at Yonghung until 1600. The movement was slow, and the con-

voy stopped time and again to investigate groups of civilians near the road, and occasionally to send out a patrol or engage in a small fire fight.

At Yonghung the troops were unloaded in different areas. I designated a rendezvous in Yonghung and waited for my trucks to assemble. The first trucks arriving at the rendezvous I moved out as a serial at 1700. It was 1800 before the rest were ready to go. The return trip should not have taken over two hours, but before I could clear the town I had to wait for a long Marine tank convoy. I was delayed over an hour and it was dark before my serial left Yonghung. My jeep was the last vehicle.

After we passed Kowon, about halfway to Wonsan, I noticed a fire up ahead. I doubled the stopped convoy and at the head of the column I found a 2-1/2-ton truck, loaded with 55-gallon drums of gasoline, on fire. The truck had been burning for some time since the drums were already beginning to explode. The flaming vehicle was in the middle of a narrow, one-lane causeway, with rice paddies on each side. My lead vehicle was halted at a fork in the road. The burning truck was on the left fork, which was the main road. I was quite sure from my previous trips that the right fork went through a village, bent to the left, crossed a bridge, and joined the main road about two miles away. I told the sergeant in the lead vehicle to reconnoiter the right fork to the main road, checking especially the capacity of the bridge. He took several men with him in his jeep, and on his return said the road was wide enough and the bridge strong enough to support a 2-1/2-ton truck.

The convoy then proceeded by the right fork, but stopped about a mile farther on. Again I doubled the column to see what was wrong. The sergeant told me things didn't look right to him. Although the civilians were under curfew, a civilian had stood by the road as he drove through the village and waved the convoy on. Farther on, seven or eight civilians were standing in the road, but scattered when they came within the headlight beams. I told the men to remount and continue on, but at that moment we were struck by small-arms fire from both sides of the road and in front. We were forced to the rear, and I instructed the men to stay on the road and fire at anyone who approached from the fields on each side of us. This was to prevent our men from firing at one another in the dark.

Making a defense with these 25 to 30 men was virtually impossible. I didn't know them, since they were not from the 377th. Some of them had no weapons. One truck mounted a caliber .50 machine gun, and I ordered the driver to return fire with it. He got into position and pulled at the operating handle, then declared that the weapon was jammed. Later, the enemy turned this gun on us, and I believe that driver just didn't know how to use his weapon. In the circumstances I could do nothing but order the men to move to the rear of the convoy. At the tail of the column I ordered the last four trailers unhitched, the trucks turned, and the men to load up and drive out. Three vehicles were turned around, loaded, and moved out. Then I discovered I was alone with the fourth truck! All the men had left in the first three.

I got into the fourth truck, started the engine, and turned it around. As I did so a North Korean ran alongside. His white clothing stood out clearly in the night. I pointed my pistol at him and fired twice. I either hit him or scared him, because he dropped back, and I drove away.

Half a mile down the road I passed two of the trucks that had preceded me. Both were in a ditch, and one was on its side. Then I came to the third truck, which was halted and blocking the road. A hail of fire began to hit my vehicle from the left and I believe a hundred men were firing their rifles from an embankment. Bullets splintered the hood and the cab of the truck, and I felt one nick my leg. I jumped from the truck on the right side and ran through the rice paddies. I put a good mile between me and the scene of the ambush, but I saw none of the men of the convoy in that distance. Then I lay low for the night.

I heard the enemy soldiers driving the vehicles during the night, and searching everywhere for our drivers. Early in the morning I heard someone walking about, and I saw he was an American. I told him to be quiet and to join me, but he was so disgusted and tired he didn't seem to care. He said he had been captured by two North Koreans during the night, and that they had debated what to do with him. One obviously wanted to kill him, the other was for letting him go. Finally, they relieved him of his valuables, hit him over the head with his own rifle, kicked him, and let him go.

Late in the night the guerrillas burned all the vehicles, since they could not take them up into the mountains with them. During this night Kowon was recaptured, and the 65th Infantry and the 96th Field Artillery Battalion at Yonghung were both under heavy attack.

When the civilians began to come out of doors next morning I figured everything had quieted down. The enlisted man and I forced a civilian to guide us to the main road, and we started walking toward Wonsan. We hid when a jeep came along until we were sure it was carrying Americans, then we hailed it. The ride took us to X Corps headquarters, where I reported to the transportation officer, and later to G2.

I found I was not wounded in the leg as I supposed, but I had bullet holes through both trouser legs. I never learned what happened to the men of that convoy, for they came from so many different units. Those who escaped just returned "home." My jeep driver came back a day after I did, with a story that matched mine.

Two days later, the 377th moved the equipment of X Corps headquarters to Hamhung. We were billeted in that city and worked directly under the corps transportation officer until the 52d Transportation Truck Battalion and its other companies joined us. About the third week in November we were attached to the 7th Infantry Division and the company moved to Pukchong and worked directly under that division's G4.

We moved rations, ammunition, and gasoline for the 7th Division over one of the highest and most difficult mountain ranges in Korea. The main supply road was only one lane wide over a mountain that was 11 miles uphill and 9 miles downhill (going north). MPs with telephones and radios were posted on each side of the mountain and controlled the traffic. Convoys moved as quickly as they were loaded, and the south-bound trip usually carried troops, prisoners, or empty gasoline drums. A temperature of 10 below zero in the mountains did not contribute to the comfort of any trip.

On 27 November I was instructed to take my truck platoon to X Corps headquarters at Hamhung. There I was to meet a 7th Division liaison officer and receive further instructions. In Hamhung the liaison officer told me I was to shuttle parts of two infantry regiments to the Changjin Reservoir area.

On 28 November I loaded a reinforced infantry company of 325 men and headed for a small town 15 or 20 miles north of Hamhung. I unloaded the troops and went back for a second shuttle. I was met by a messenger who informed me I was to take the same reinforced company and move it to its regimental CP on the highway east of Changjin Reservoir. The instructions were rather vague as to the CP's location, but I returned and remounted the troops.

About five miles farther north, MPs stopped the convoy and delayed it for about two hours while engineers cleared the road ahead of a landslide.

While we were waiting on the road some North Korean soldiers were captured. They were walking down the road in civilian clothes but our KATUSA[1] troops spotted them. We inquired why our men were so certain, and they replied that the "civilians" had their hair cut—strictly a military operation in Korea. Interrogated, the prisoners admitted their military identities; one claimed he was from a North Korean regiment, the other said he was attached to a Chinese unit.

At 2100 we approached Koto-ri and were halted by U.S. marines. We were told the enemy had a roadblock just a thousand yards farther up the road. Our convoy pulled into the Marine perimeter for the night, and the following morning Col. Lewis B. Puller, USMC, formed all troops in the vicinity into a task force. This included a Marine company, our reinforced company, and a company of British Royal Marine Corps commandos. An artillery barrage began, and then U.S. Marine jet fighters plastered the hills on both sides of the road. I watched the show as I waited at the U.S. Marine command post.

At about 1400 I was ordered to a rendezvous point, but on arriving there found the infantry were still fighting. I stopped the convoy a few hundred yards behind the infantry and went forward on foot to the company commander. I located him in his gully CP and told him I had instructions to carry him up the road. He replied that he was still under fire and didn't see how he could possibly load up or continue through. He dispatched a messenger to inform Colonel Puller of the situation. About two hours later a message came back, again ordering the infantry to load up and proceed.

As a result of loading under fire, the infantry got all mixed up and lost its tactical unity. Other convoys began moving at the same time, and we were soon mixed with Marine and Army trucks. The British commandos were riding with our marines.

The trucks maintained a 50-to-100-yard interval. There were frequent unexplained halts, and by dark my vehicle had made only three miles. I walked forward during a halt to see the cause of the delay. At this point the road was running through a valley some 500 or 600 yards wide, flanked by sharp-rising mountains. To the right of the road was a narrow-gauge railroad in the scant fifty yards between us and the slope. To the left it was almost five hundred yards to the incline, but a fast flowing mountain stream divided the distance. It was very dark except for the period when the moon was directly over the valley.

When I was some four hundred yards ahead of my vehicle, I saw five or six Chinese soldiers walking along the railroad track to our right. It was just light enough to identify their quilted uniforms. I warned a nearby truckload of infantrymen and they began searching the area with rifle fire. I pitched a grenade in the direction where I had last seen the enemy. This acted as a signal, and the Chinese began firing on us from the railroad and up on the mountainside to our right—all the way up and down the column. Rifles, machine guns, grenades and mortars, all east of the road, began striking the vehicles and men.

Our trucks were widely separated and there was no great concentration of men at any point. Near me were only a couple of my own men and some infantrymen. Throughout the night I did not see any of the infantry officers, but our convoy was spread over three or four miles, and they could have been anywhere in the column. Because of the confusion in loading, not even squads were together. I took command of everyone near me and directed the men to fall behind the trucks into the field west of the road. There was little cover, however, and it was impossible to dig into the frozen ground.

Casualties were mounting, and I was wounded twice. I was hit once in the back by a shell fragment, and in the shoulder by a caliber .45 slug that broke my collar bone and lodged in my neck. The pain was great. I thought I'd been hit in the neck, and an infantryman even bandaged me there. He also gave me a shot of morphine to ease the pain. I had my head propped up on my helmet and continued to give what little control was possible in the situation.

One of my men told me a truck in the middle of the valley floor had a caliber .30 machine gun strapped to its fender and a box of ammunition under the seat. After the attack had begun the driver had turned this vehicle around and had tried to make a break for it down the middle of the field, but had abandoned the attempt. As luck would have it, the truck was now in clear moonlight, in the direct line of fire, and the machine gun was strapped to the front fender on the side nearest the enemy. I called for volunteers, fearing that if we didn't get the gun the enemy would. None of the infantrymen would go, but one of my truck drivers volunteered and made the trip. He reached the truck, crawled onto the near fender and reached over the hood to pull the machine gun from its position. He could not get the tripod. Then he got the box of ammunition from under the driver's seat and returned. Throughout the night he fired the machine gun from the hip, and it was an important weapon in our defense. When he ran out of ammunition he threw the gun in a deep hole in the stream. This soldier was later awarded the Silver Star.

With our heavy casualties, and a feeling the enemy was coming in on our flanks, I decided to fall back to the stream at about 0200. At 0430 it became clear we could not remain there either. I told the men to split up, cross the stream, and head for the mountain behind. The numbing effect of the cold seemed to make it less effort just to remain where they were, and I finally decided to move on with just one of my truckers. I had to be helped to get my head up, but then I could walk. As the infantry saw me go they slowly moved out, waded the stream, and started up the hill.

As I got farther up the hill it developed that my own party would be three enlisted men and myself. One of the truckers and the infantryman with us were wounded. Only one driver was unhurt. He helped us along. After all that had gone on during the night, the infantryman still clutched a blanket, and carried it with him.

When we reached the hilltop it began to get light. I knew our feet would freeze if we did not give them attention since we had gotten them wet in wading the stream. I always carried a knife that was fashioned from an old, cut-down cavalry saber, and we used this to cut the frozen laces of our boots. I hoped to take out the heavy, inner-liner socks and warm them next to my body, but they were so frozen to the boots that I could not get them out. I threw away both socks and shoes. I used my pile-liner cap in place of one shoe and tied strips of blanket around the other foot. The men did the same.

Near daylight we became aware of another party near at hand. We were scared, but no worse than the three marines who finally challenged us. We had been within fifty yards of one another for some time without knowing it. I still laugh at the marine challenging us with his carbine. It had gotten wet when he crossed the stream and the bolt was a solid block of ice. He could no more have shot me than he could have shot his dear old grandmother back in the States.

None of the marines was wounded, so I asked them to go back the three miles to the Marine perimeter and see if they could get us some help. They agreed, but after a two-hour wait we became apprehensive. Finally, our small party began to move painfully back toward the Marine position. Soon it became apparent we would have to return to the road to make the journey. We did so and marched straight down the road to Koto-ri. It was an unusual journey, for we knew the Chinese were all about us and watching us walk. From near us they fired at a helicopter that flew up the canyon. Yet they let us hobble past.

When we reached the Marine perimeter at Koto-ri, I found that the town was surrounded. With the other wounded I was placed on a stretcher in a tent, and stayed there for three days. During the first two days rations were short and I got only one can of C rations and a couple of cups of fruit juice. Food didn't bother me much at that point, however. On the third day an airstrip was opened and the food became much better. Light planes began to fly out the more seriously wounded, and I went out by that method. From Koto-ri I flew to Hamhung, then was loaded on a C–54 for Japan. From Japan I was flown to the United States.

November 1950 was a pretty rough month on the 377th. At the end of that period we had only 21 vehicles left of our original 48. It was pretty tough on my platoons, too. In the ambush above Koto-ri, 18 of my 30 men became casualties: 3 killed, 7 wounded, 8 missing. I noticed 4 of the missing on the POW lists released by the Chinese. They were carried as "members of the 7th Infantry Division."

Notes

[1] Korean Augmentation to the United States Army.

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Division-Level Maintenance Support in Korea

Introduction. Lt. Col. (later Lt. Gen.) Joseph M. Heiser, Jr., describes the activities of the 707th Ordnance Maintenance Company, 7th Infantry Division, in Korea in 1951. He provides an excellent eyewitness evaluation of the planning and execution of division-level maintenance support during the Korean War.

On my way north to become ordnance officer of the 7th Infantry Division in January 1951, I stopped to talk with the ordnance officer of X Corps. He told me frankly that ordnance conditions in the 7th Division were not what they should be, and that I was going into a situation where my career was at stake. The commander of X Corps (Lt. Gen. Edward M. Almond) [had] asked two of the regimental commanders of the division about their ordnance support and they had told him that the company might as well have stayed in Japan: the units of their regiments never saw it and they did not feel it was supporting them. Feeling had reached such a point that ordnance men along the road were refused food by units of their own division!

When I reached the division I concluded that the ordnance resources had not been fully utilized. The 707th Ordnance Maintenance Company was located near Yongchon, 120 miles south of the division's CP at Tanyang. A turnaround between the company and the division took twenty-four hours.

There were several reasons for the distance between the company and the division. Part of the division had suffered heavy casualties in the action near Changjin Reservoir. After evacuation from the port of Hungnam the division had assembled and hurriedly moved off to fight in a new sector. January 1951 was a month of uncertainty in the division, and it hesitated to move its heavy equipment forward as it advanced.

Reproduced from Joseph M. Heiser, Jr., "Close Ordnance Support" in John G. Westover, ed., *Combat Support in Korea* (Washington, D.C.: U.S. Army Center of Military History, 1987), pp. 128–32.

The ordnance company was weighted down by a backlog of two hundred trucks waiting for third-echelon repairs. In addition, the company was carrying three hundred tons of ordnance parts above its authorized allowance. It would take sixty 2-1/2-ton trucks to carry the three hundred tons even with the normal 100 per cent overload! The extra parts were being carried because the former ordnance officer feared he'd sometime want a part that the ordnance depot company wouldn't be able to supply him. However, there was no selection in the parts. Many of them were nonmoving items, and a check of the stock-record card showed eighteen thousand items. By April this had been reduced to about six thousand, and I am convinced that it could have been cut further.

The backlog of vehicles and the excess parts kept the ordnance company from joining the division. Companies and regiments were so far from ordnance that they had little choice but to run their vehicles until they quit. Then the vehicles had to be towed back.

Our division had at its disposal the support of the 7th Ordnance Medium Maintenance Company, yet it failed to use it properly. This support company was only five miles away, but vehicles were sent there only when the division's company did not have, or could not get, parts to make a repair. It was ironic that the support company did not overload itself with parts, yet it more frequently could get what it needed because the supply sergeant worked more closely with the depot company.

Shortly after I came into the 7th Division, Maj. Gen. Claude B. Ferenbaugh assumed command. He was vitally concerned with the problems of the technical services and gave us much of his attention. I knew he expected aggressive action, and I meant to deliver it.

I turned over our surplus parts and backlog of vehicles to the supporting ordnance company. Then I moved the division's ordnance company to Yongju—only twenty miles behind the division. Within ten days the supporting ordnance company had cleared the backlog, absorbed or returned the extra parts, and had moved near us. From this time on the two ordnance companies worked closely with each other and, on an informal understanding, under my direction. The supporting company leapfrogged to provide support. Sometimes it sent out detachments to assist our using units, and it was always available to take over our backlog when we had to move quickly. In those days we were very careful to maintain our mobility.

Before I took over, the division's ordnance company had sent detachments to the using units only a few times. Immediately after I took command I sent one third of the ordnance men out in detachments to the regimental combat teams. The men lived and worked right in the service companies. They taught first- and second-echelon maintenance and repair, and gave on-the-job training. In an emergency they even did first- and second-echelon maintenance themselves to get a unit on its feet. At the same time, the service company trainees did a good deal of the third-echelon work under our supervision. It was a turn-about proposition, and we were less worried about echelons than giving training and repairing vehicles.

For the next six months the close contact between the ordnance men and the using units was marked. By June, two thirds of the ordnance company was with

the service companies. During this month our regiments were called upon to make a series of probing attacks. Commanders felt, as they had during the January action, that they needed ordnance support, but they were reluctant to burden the forward areas with heavy equipment. Here the well-developed cooperation between the ordnance men and the service companies paid off. The 7th Ordnance Medium Maintenance Company and one third of the division's company stayed well to the rear at Chunchon, while the ordnance service was still being maintained as far north as Hwachon by our attachments to the service companies. Anyway, preventive maintenance and careful repair had so cut down the third-echelon repair that we never had more than 35 vehicles in our shops at one time. Actually, the company was begging for work!

Another vital service that the ordnance company provided was to supply qualified mechanics and drivers to the division. Our on-the-job training was building up a creditable maintenance force, but rotation meant that our trained men would be leaving. The replacement pipeline did not bring us adequately trained drivers or mechanics, so we set up a division mechanical school.

The division's G1 screened all of the replacements for mechanics and men whose civilian experience indicated mechanical ability. Every man he found was brought to our ordnance school. We set up our own staff, consisting of a captain, a warrant officer, and eight ordnance technicians, and we normally had from eighty to a hundred in training. We had close coordination with the using units and every feature of the school was tailored to their needs. If the artillery needed a gun mechanic, we trained one. If a gun mechanic came to us needing refresher training, we gave it to him. The captain and two NCOs did the planning, the others checked the progress. As the training was primarily on-the-job in nature, we really had as many instructors as there were mechanics in the company.

As soon as the automotive mechanics and others were trained, we formed them into detachments and moved them out to the using units. We maintained control over each man, checking to see that he kept our standards. We transferred the trainee to a regiment when he seemed ready. A gauge of the success of our school was that we never had a single complaint about a man we trained.

The key to the close support we furnished the 7th Division was the close liaison. I spent 90 per cent of my time visiting the using units, and my staff was constantly doing the same. Command liaison was most important, though, for the commanders wanted to talk with the man who actually made the decisions.

Our coordination was not limited to the division. The strengthened ties with our support maintenance company made for greater mobility and flexibility. In March 1951 the 7th Division made a hurried move from Hajinbu-ri to Hangye—a distance of a hundred miles. Two RCTs were to swing south while the third was to take a calculated risk and travel a road through country whose status we did not know. The lone RCT was accompanied by a strong detachment from our ordnance [company] to assist it in case of breakdowns. The supporting ordnance company split into three detachments and established maintenance points (garages) along the southern route. The bulk of the division's ordnance company made an administrative move. It was, therefore, able to begin operations in the new position immediately.

In April 1951 another important move was ordered, but the final destination of the division was not known. We transferred all of our repair backlog to the supporting ordnance company and it moved straight south. In this way it was able to support the division regardless of the direction the division shift might take.

Close support is, and must be, the aim of every division's ordnance company.

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Division-Level Quartermaster Operations in Korea

Introduction. Lt. Col. Marcus E. Cooper outlines Quartermaster support of the 1st Cavalry Division in Korea in 1950. His eyewitness account of the operations of the 15th Quartermaster Company provides an excellent view of division-level supply, storage, and graves registration operations during the Korean War.

Throughout the first six months of 1950, the 1st Cavalry Division was so scattered that it was difficult for its 15th Quartermaster Company to support it. I recall that division headquarters, the 2d Battalion of the 7th Cavalry, and service troops were at Camp Drake; the 8th Cavalry and the 1st Battalion of the 7th were in Tokyo; the 5th Cavalry was at Camp McGill; Division Artillery was at Camp Drew. Early in May the 8th Cavalry was shifted with elements going to Camp Zama and Camp King.

About 25 January 1950, post quartermasters were assigned and army service units began supplying each of those camps. This left the division quartermaster with technical responsibility but no operational control of the division's supply operations. The extent to which this separation of functions took place is illustrated in the case of the quartermaster of Camp Drake. When the executive officer of the 15th QM Company was assigned this task, he was transferred to the 8013th Army Unit.

In 1950 the 1st Cavalry Division was emphasizing combat training of its units. The 15th QM Company, relieved of most of its operational responsibilities, spent most of its time learning combat principles. Little practical training was possible for the class II and class IV supply sections, but the class I and III groups were able to work in the maneuver area at Camp McNair. My company commander (Capt. Jenis C. McMillan) and I were working on a plan to train the quartermaster

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Reproduced from Marcus E. Cooper, "Division Supply Operations," in John G. Westover, ed., *Combat Support in Korea* (Washington, D.C.: U.S. Army Center of Military History, 1987), pp. 141–50.

personnel by attaching them to the army service units when the Korean action broke out.

I believe it was 1 July 1950 that the division was alerted for an amphibious landing in Korea. Our original landing site was described only as "somewhere along the west coast of Korea." The assault wave was to outload by 14 July, the second wave on the 16th or 17th, and the third wave several days later.

I had been taught at the Command and General Staff College that it required sixty to ninety days to plan and outload a division for an assault landing. As this operation was to be accomplished in eight to twelve days, it seemed to be a tremendous task. It was.

The 1st Cavalry Division's strength was only 13,000 or 14,000, with a T/O&E in proportion. Quartermaster requirements for the landing were 22 days of class I (7 days operational, 15 days class B rations); 30 days maintenance factor of class II and class IV supplies; and 30 days of class III.

Although there was short supply of the operational rations, class I presented few problems. There were plenty of B rations available. Class II and class IV were more difficult, but class III gave us the most trouble. There were two problems: how many trucks we would have, and how far they would go. First our tank company was taken from us, then our vehicle strength was changed from day to day. We guessed that ten gallons per vehicle per day would be normal at first and, fortunately, we guessed fairly accurately.

I was charged with transporting class II and the operational rations of class I to shipside in the outloading. Army delivered the B rations. Class II and class IV were to be loaded by my personnel coming in with the third wave.

I was allotted space for 65 officers and men and 28 vehicles in the assault wave. I elected to go, and chose the purchasing and contract officer (Lt. Charles Lambert) and 4 men from the division quartermaster's office; the 2d Truck Platoon (Lt. James Evans); 28 men from the Supply Platoon (Lt. Albert N. Abelson); and the Field Service Platoon officer (Lt. George M. Gibbs). In the second wave my executive (Lt. Francis P. Cancelliere) and Captain McMillan were to bring the bulk of the quartermaster troops, while the remainder were to come in the third wave on D plus 5.

Space for class I and class III supplies was authorized on each of the three waves, but class II and class IV supplies were all to come in the third wave. Each individual was to carry two operational rations, two suits of fatigues, two pairs of combat boots, and necessary underwear and toilet articles. Other clothing was to be carried in duffel bags. Vehicles were fueled and carried extra cans of gasoline.

On the morning of 18 July the first landings were made without opposition, not on the west but on the east coast of Korea—near Pohang-dong. The shore party received class I and class III supplies and our supply section began to issue them on D plus 1. All units were issued B rations to maintain the two-day level per individual. Instructions were also given to use the B ration whenever possible.

I anticipated that the division would remain in the beachhead area until the second wave arrived. The urgent need for troops near Taejon, however, made necessary the immediate commitment of our first wave. A typhoon delayed the second wave, and the third was still in Japan waiting for ships.

On the afternoon of the 20th, the 5th Cavalry Regiment started for Taejon. At about 2000 my truck platoon and a supply detachment followed. The trucks carried 90 per cent class III and 10 per cent class I supplies, since we were less concerned with going hungry than with losing our mobility. I instructed Lieutenant Lambert, who commanded this force, to establish a supply point in the vicinity of Kumchon or Kwan-ni, the situation to determine which was the most desirable. That night the supply platoon began loading class I and class III in rail cars for shipment forward. I left the Pohang-dong area on the morning of the 21st with division headquarters. Lieutenant Abelson kept a detachment to finish the loading. At Kumchon I learned that Lieutenant Lambert had opened our supply point at Kwan-ni, and I sent this information back to Abelson. By the 23d we were receiving and issuing rations carried by rail from Pohang-dong.

On the 21st I placed my first order for class I and class III supplies directly with the quartermaster of Eighth Army (Col. James M. Lamont). Although we had fifteen days' B rations coming over the beach at Pohang-dong, these were divided among the different waves and we dared not chance a shortage. Army [headquarters] told me I could get B rations as I needed them, but few operational rations were available. I made every effort to have our operational rations forwarded from Pohang-dong in full-car lots. These shipments were issued only to units whose patrols, drivers, and men were normally away from their kitchens at mealtime. We also had a heavy demand for the C ration because its greater variety of meat items made it popular.

The quartermaster of Eighth Army told me I would receive little in class II and class IV supplies, for his stocks were almost depleted. I didn't worry about this because I knew I had a thirty-day maintenance factor coming in the third wave, and I knew each man had been well equipped when he left Japan. I would not have been so unconcerned had I known that the thirty-day supply would not arrive, and that, because of confusion in shipment, 70 to 80 per cent of the personnel of the regiments would not receive their duffel bags. The rocky hills cut up a pair of boots in twelve to fourteen days, while the rain took its toll of boots, fatigues, and ponchos. It was 1 August before we received much class II and class IV assistance, and by then we needed clothing, shoes, stove parts, and cleaning and preserving materials.

On the 22d, at Kwan-ni, we opened the first cemetery for the division. We had no graves registration section or trained personnel, and our few graves registration supplies were with the second wave. Eighth Army could not evacuate bodies, and we had to provide for our own dead. Not only were we short of experience in graves registration, but I had no manual covering the subject. Fortunately, the division GI had a manual with some information and the division chaplain had a pamphlet. I sent Lieutenant Evans to Eighth Army headquarters at Taegu and there he obtained a supply of burial bottles, personal-effects bags, mattress covers, and burial forms.

I searched the Kwan-ni area for a cemetery site but most of the flat ground consisted of unsuitable rice paddies. The most likely place for a cemetery was 400 or 500 yards from our class I and class II supply point, which was not ideal. G4

approved our location, and the first interments occurred on 23 July. We had no fingerprint kit, but we soon found that a regular stamp pad would work. Every man buried in our cemeteries was fingerprinted, regardless of whether he was identified or not. We made a careful note of all identifying marks, scars, and tattoos. Some 32 or 33 bodies were interred at Kwan-ni, only 2 of which were unidentified. Some bodies were returned by the regiments, some by the companies, others evacuated through medical channels, and occasionally a driver would find a body along the road and bring it to us.

We had trouble with the personal effects. If the effects were still on the body, we inventoried them. If the effects had already been inventoried, we checked to see that all were present and then forwarded them to Eighth Army. But army began to notice that our inventory of money sometimes did not tally with the amounts it received. Several times there were shortages of five or ten dollars, though never was the complete sum missing. We could not account for this. After I left the division I heard that some of the men in the graves registration section had been caught stealing.

We also had a case where a ring had been removed from the finger of a British major, but this occurred before the body reached us. I had heard that the body was being evacuated through medical channels, and was present when it arrived. That night a friend inquired whether a signet ring was among the effects, for he knew the major's family attached great sentimental value to it. The inventory did not list the ring, so we disinterred the body to make sure it had not been overlooked. It was obvious that the major had worn a ring a short time before, but it was not on his body when it reached our cemetery.

It was in Kwan-ni that our ration first included fresh meat. By mistake a carload of rations consigned to the 25th Division had been placed on our siding. The car, containing frozen ground beef, was not refrigerated, and it was obvious some spoilage had already occurred. I called army and received permission to utilize whatever I could. Mr. Kummer and his food service personnel checked each box, discarding all meat about which there was the least doubt. The over-all loss was about 35 per cent. The remainder would not feed the entire division, so we got in touch with the units' S4s and told them, "first come, first served." We had no trouble clearing the shipment.

The bulk of the quartermaster company, coming in the second wave, joined us in Kwan-ni during the night of the 24th. We selected a school building as a billet but never occupied it. The order came to displace our class I and class III supply points to Kumchon because the infantry was being pushed back.

Our evacuation was somewhat confused in this, our first experience in withdrawal. We issued two days of B rations to every unit that would accept them. This cut our load and at the same time insured against need if there were any delay in opening our new supply point. We loaded both the railroad cars and the trucks. There wasn't enough transportation, so we had to shuttle with the trucks. We got all of the supplies out, but the last two trucks were still being loaded after the infantry had cleared the area. Several rounds of mortar fire landed nearby but caused no damage.

We opened our new supply point in Kumchon without delay. Everything at Kumchon was kept mobile and, as much as we could, we left supplies in boxcars until we actually issued them. Rations were coming to us direct from Pusan, but carloads of supplies from Pohang-dong, which had been delayed or misshipped, were still arriving.

In Kumchon I found that the quartermaster of the 25th Division (Major John Pachomski) had his distribution point in the marshaling area. The desirability of our companies working together was obvious, and my company moved next to his. The 25th QM Company helped tremendously by giving us cleaning and preserving materials, soaps, mops, brooms, and a few items of clothing.

While we were in Kumchon we began to receive our first shipments of fresh vegetables. These were airlifted from the hydroponic farms in Japan. The vegetables came in limited quantity every second day. Rather than issue a little to each unit, we rotated the delivery and gave enough for an ample serving. We had a standing priority on fresh foods for the hospital, then for the front-line troops. These vegetables were a real morale-builder.

We opened our second cemetery in Kumchon on the 26th. It was our smallest, for by now it was nearly impossible for the infantry, to recover its dead as it fell back. It was in Kumchon that the 1st Cavalry Division received Eighth Army's famous "last stand" order which forbade us to fall back. This order was rescinded, however, and on the 31st we moved to Poksong-dong for two days.

In late August, division ordered 100 men and 4 officers of the quartermaster company to be held on five-minute alert. These men were part of Task Force Allen—our last reserve. Fortunately, this force was never needed.

The Eighth Army supply points in Taegu were located in the railroad area. We got permission to locate our class I point nearby, and obtained the use of a siding and shed area for our class III supplies. The II and IV area was six or eight blocks away from the marshaling yards. Eighth Army had five large warehouses for class II and class IV supplies, and it turned two of these over to us. In these warehouses we stored PX supplies and beer—when they were available. To save needless handling, our supplies came directly from Pusan by rail instead of stopping off in the army depots.

The fighting came close to Taegu and several nights enemy tanks ineffectively lobbed shells into town. It was a real convenience to have our warehouses near those of army [headquarters]. [Eighth] Army moved its depot troops out of Taegu several times, and turned its dumps directly over to me. In turn, I issued supplies to everyone in the area. At one time or another I supplied the 9th Infantry (2d Infantry Division), the 27th Infantry (25th Infantry Division), the 21st Infantry (24th Infantry Division), and numerous nondivisional units.

Each time the depot troops pulled out of Taegu they would tell me approximately how many troops I would be expected to supply. When I submitted requisitions to Pusan they were honored without question—even when I drew for 35,000 instead of 13,000. Class III items were usually in good supply except for an occasional shortage of 80-octane aviation gasoline. Some components of the B ration would build up and I returned flour and meat to Pusan whenever I feared the surplus was great enough to embarrass me if we had to move quickly.

At Taegu we received our first bath trailers. The third wave leaving Japan received these, though not in time to test them. We found that two of the four did not work, and the diaphragms and other parts could be repaired only in Japan. So back they went.

We used the civilian laundries in Taegu, but their capacity was insufficient. We hired men, women, and children, furnished them soap, and had them washing clothing by hand in the Sin-chon River. In September our first laundry unit was in operation under the control of Capt. Carl D. Hennessy, who had recently joined us. We continued to use the Taegu laundry, but now dispensed with the hand-washing.

Soon we received six ice-cream machines. These were much too bulky; two 2-1/2-ton trucks were required to move each machine. We turned them back to army immediately. In 1951, the division received improved, portable machines which supplied ice cream to the entire division on a once-a-week basis.

Eighth Army took over operation of the Taegu ice plant. The medics approved the plant for sanitation and the engineers chlorinated the water. Ice was issued daily to every unit. An unusual use of the ice came when the enemy surrounded a company of the British 27th Brigade (attached to the 1st Cavalry Division for logistical support as well as operations). The isolated troops suffered from a water shortage. Attempts were made to airdrop water in one-gallon canvas bags, but these split and the water ran out. One of my officers (Lt. McGail C. Baker) suggested that we drop ice. We placed 15- to 20-pound blocks in barrack bags and dropped them with great success.

The truck platoon I had brought with me in the first wave was now strengthened by the arrival of the other two. One platoon I did not control, however, for it was attached to the 2d Battalion, 7th Cavalry. This battalion was kept mobile as a part of the Eighth Army "fire brigade" system. Although we were short of trucks, we were not hampered since we depended on rail to bring us our supplies.

Early in August I discussed with the Eighth Army quartermaster the need for winter clothing. Already it was cool at night in the hills where our infantry was fighting. Eighth Army was aware of the need and had established a three-phase program for issuing winter uniforms—contingent upon delivery of clothing from the United States on the dates requested. The first phase included the delivery of winter underwear, M43 jackets, and gloves by 15 September. The second phase was to bring wool clothing by 1 October. The last phase would deliver sleeping bags, pile-lined jackets, overcoats, and wet-cold climate clothing by 15 October.

The underwear, jackets, and gloves arrived about the middle of September and we issued them as fast as possible. Unfortunately, before all our clothing could be issued to the units, the breakout from the Pusan perimeter took place and we had no chance to complete delivery for some weeks.

By 24 September, the 1st Cavalry Division's progress was such that we believed it was time to push out class I and class III distribution points. Lieutenant Cancelliere and one of our new arrivals (Lt. Earl W. Gallert) located these at Chongju on the 25th. Our three truck platoons were with the infantry, and army furnished us two truck companies to move supplies. I stayed with the company in Taegu until 2 October.

It was about 130 miles to Chongju and bad roads made it a full-day trip each way. On the 26th, the division advanced more than a hundred miles to make a junction at Osan with the 7th Infantry Division, which had landed at Inchon. On the 29th, Cancelliere established another class I and class III point at Ansong to receive supplies that had been airlifted to Kimpo. I sent some B rations to Ansong by truck, but army stopped this.

Division supply points were located at Taegu, Chongju, and Ansong, with supplies furnished from both the north and south ends. I had no communications faster than messenger, and I soon lost touch with the situation. I hoped that class I and class III supplies were being issued, and I learned later that they were. One of our truck platoons returned on 2 October, and I moved the company to Suwon. I left enough personnel in Taegu to operate the class II and class IV points, for I wanted to be sure these items got forward to us. Small class I and class III distribution points remained in Taegu to supply the division's rear-echelon troops, but had I known the situation forward I would have arranged for the rear echelon to use army supply points in Taegu.

Driving north we carried enough winter underwear, M43 jackets, and gloves to supply the units that had not drawn them in Taegu. We did not get to issue the clothing until the troops were in Kaesong on 9 October. I found that on the rapid march of the division those men who had received underwear and jackets took care to hold on to them.

Our Suwon distribution points opened on 3 October. For about a week we were issuing everything on hand and replacing nothing. Then we closed the I and III points in Taegu but left the II and IV supply personnel there until they could get the clothing forward. The shortage of both rail facilities and trucks kept us from moving the clothing at this time, even though the weather was getting cold.

In late September, 3d Logistical Command opened at Ascom City—between Inchon and Seoul. I opened a class III distribution point at Yong-dungpo on 5 October. On the 9th we started an all-class supply point at Kaesong, and here we opened our fifth cemetery. When we moved from Kaesong on the 15th we began a series of class I and class III supply operations that were little more than one-night stands. Nothing was dumped on the ground, and we loaded from tail gate onto tail gate. We opened at Hanpo-ri on the 15th and closed on the 18th. We opened at Sinmak on the 18th and closed on the 21st. Hwangju opened on the 19th and closed on the 20th. On the 21st we opened a distribution point at Pyongyang and it remained open until 4 December. On 30 October we were to establish a dump just south of Unsan, but the men found the town in enemy hands, so they set up some eight or ten miles to the south. On 31 October, we opened a dump at Anju to receive airlifted supplies landed at Sinanju for I Corps. We later turned this operation over to Eighth Army. On 2 November we opened a supply point at Pakchon but we had to evacuate it hurriedly the next day. The quartermaster company did not lose anything there. However, part of the 8th Cavalry, one company of the tank battalion, and one company of the engineers came out light and fast. We had to replace a thousand sleeping bags, two or three kitchens, most of the mess gear, and a lot of clothing.

The bulk of the division's winter clothing was still in the Taegu warehouses—400 to 500 miles away. As soon as the railroads began operating as far north as Seoul, we moved several carloads of winter clothing to that point. That meant the clothing was still 170 miles from us, but division G4 began to canvass all units for trucks we could borrow to make the trip to Seoul. It was very cold now and everyone supplied trucks until it hurt. We sent 180 from Pyongyang to Seoul in convoys of 30 and 40. The roads were so bad that there was about a 30 per cent truck casualty rate from broken springs.

Our boxcars had not been guarded on the railroad, and some pilfering had taken place. But we had anticipated a strength of 18,000 U.S. and 8,500 KATUSA personnel in our requisitions, whereas we now had 18,000 U.S. and only 3,500 KATUSA personnel. An officer in Pyongyang separated the clothing and issued it in the priority: infantry, engineers, artillery, other units. In no case did a service unit or headquarters draw anything out of sequence, but a fast-talking division headquarters supply sergeant almost succeeded until I learned about it. We outfitted U.S. and KATUSA personnel alike except that the OD7 overcoats went to the U.S. soldiers and the men of KATUSA drew wool overcoats.

After the rail lines were open to South Pyongyang, we received the rest of our own clothing from Taegu and also some from other sources. Soon we had an overage in certain types of winter clothing. Instead of moving this clothing to Eighth Army dumps we issued it to nondivisional units when directed by army. We also issued some clothing to British and other UN troops.

In September a wet-cold climate instruction team arrived from the United States. It consisted of Lt. Col. James P. Streetman and an enlisted man. We were in Pyongyang before they were able to instruct the troops, but fortunately this coincided with the issue of winter clothing. I believe their opportune lectures did much to prevent nonbattle casualties.

In Pyongyang an attached platoon of the 549th Laundry Company (Lt. Upshaw Sams) gave the division more laundry service than it could use. The tactical situation was so fluid that regiments often could not return their dirty clothing. In their free time we let the laundry platoon work for anyone—after they took care of the needs of the hospitals.

We opened class I and class III supply points at Sapyong-ni on 27 November and closed them on the 29th. The 29th was the day Lieutenant Evans's truck platoon got caught in a roadblock while carrying troops of the 5th Cavalry, and the day we began our long withdrawal. On the 29th, we opened a supply point at Sunchon, and hurriedly withdrew before we issued anything, At 1800 of that day we were returning to Sainjang, and on 1 December our most advanced supply point was Pyongyang.

On 2 December we began to clear our class II and class IV supplies out of the Pyongyang area. I got in touch with the assistant G4 of Eighth Army and requested ten or twelve boxcars to evacuate supplies, but he was unable to furnish them. I had two partly loaded boxcars at my siding, so I filled them as quickly as I could and they were moved that night.

On the morning of the 3d, Colonel Streetman and Lt. W. T. Niedermeyer found 4 empty boxcars and 2 gondolas of empty gasoline drums on the freight yard. The

rail transportation officer agreed to let us unload the drums and use the cars and gondolas. We loaded them with class II and class IV supplies.

At 2045, before our cars were removed, an ammunition dump several blocks from our warehouse caught fire. When the shells began to explode, the locomotives left our area. One or two of our warehouses burned and so did our gondolas. The boxcars were spared.

On the morning of the 4th, the locomotives came to pull out our loaded cars. Unfortunately, the ties had burned under the track and our cars were derailed. We loaded all available trucks with class II and class IV supplies and I put a man out on the road to offer units anything they would take. The only II and IV supplies we lost were those that burned in the fire.

On the night of the 3d, and during the 4th, we hauled class I and class III supplies from Pyongyang across the river. Again we stopped vehicles and offered gasoline and food. At 1800 on 4 December we destroyed the surplus gasoline and rations that we could not evacuate. This amounted to 15,000 to 30,000 gallons of gas—all in drums. That was the first time in Korea our company had to destroy anything to keep it out of enemy hands.

On the 5th we opened a supply point at Namchonjon; we closed it on the 8th. On the morning of the 8th we moved to Kumchon (in North Korea) and sent all our class II and class IV supplies to Ascom City.

On 8 December 1950 I was relieved of my assignment and returned to the United States on emergency leave. Colonel Streetman was assigned in my place. After I returned to Korea from my leave I spent eight months in the operations division of Eighth Army's quartermaster section.

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Rear Area Security Operations in Korea

Introduction. Lt. Col. Barton O. Baker describes the rear area security operations of the 725th Ordnance Maintenance Company, 25th Infantry Division, near Changwon, Korea, on 4–5 September 1950. He stresses the need for all logistical support units to be prepared to perform rear area security missions in addition to their primary tasks.

Every service unit needs to be organized so that it can shift rapidly from its service mission to a security mission and, if necessary, to a combat mission. To reach this standard, training, discipline, and a good SOP are necessary. To show how effective a service unit can be in a security role, let me tell you about Task Force Baker.

In early September 1950, a small Signal Corps VHF detachment was stationed on a hilltop about five miles from the CP of the 25th Infantry Division and about twelve miles behind the infantry line. This party consisted of 5 U.S. soldiers and 3 or 4 South Koreans attached for labor and security. The night of 3 September was rainy and miserable, and all the men in the detachment crawled into their squad tent. No guard was posted.

At 2200 a party of guerrillas or infiltrators—it was not established which—from the North Korean Army stealthily approached the detachment and killed them all with small arms and grenades. The newspapers condemned this action as an inhumane massacre, but from a professional standpoint it could be called negligence—or even suicide!

The next morning (4 September) a CID agent and a reporter started toward the VHF site. Part way up the hill they were wounded by grenades. Though injured, these men returned and their wounds were treated at the nearby 8063d MASH in Changwon, at the base of the hill where the action had taken place. It was obvious the enemy had not withdrawn from the vicinity of the VHF station.

Reproduced from Barton O. Baker, "Task Force Baker," in John G. Westover, ed., *Combat Support in Korea* (Washington, D.C.: U.S. Army Center of Military History, 1987), pp. 201–05.

Later that day, I was driving through Changwon and stopped briefly at the MASH. Considerable excitement existed as the result of the two incidents nearby, and the hospital officers pointed out to me that mortar fire was falling on the hillside near the hospital. The enemy obviously was well armed, but what he was firing at I don't know. While I was talking, one of the hospital orderlies came in carrying a spent bullet that had just pierced his tent.

The location of a hospital, ammunition dump, railroad, and division main supply road made it vital that this area be protected. I phoned the division CP and reported the situation to the commanding general (Maj. Gen. William B. Kean). When General Kean asked for my recommendation, I suggested that since it was already 1700, we could do little now except post security. I told him 150 men should be adequate. The general asked where I proposed to get the men. I replied that I could use the men from my 725th Ordnance Company. He agreed, and said the division reconnaissance company would come as soon as it was available, and other units also would be dispatched. The force was designated Task Force Baker, and I was to command until the recon company jumped off against the enemy, at which time its commander (Capt. Charles Torman) would take over.

Immediately after talking to General Kean, I called the ordnance company and told the commander (Capt. Ira Snyder) to bring 3 officers and 150 men to my CP location in Changwon. These men arrived in sixty minutes, with their individual weapons, three light machine guns, a rocket launcher, and four radios. The group was already divided into three platoons, each with an officer.

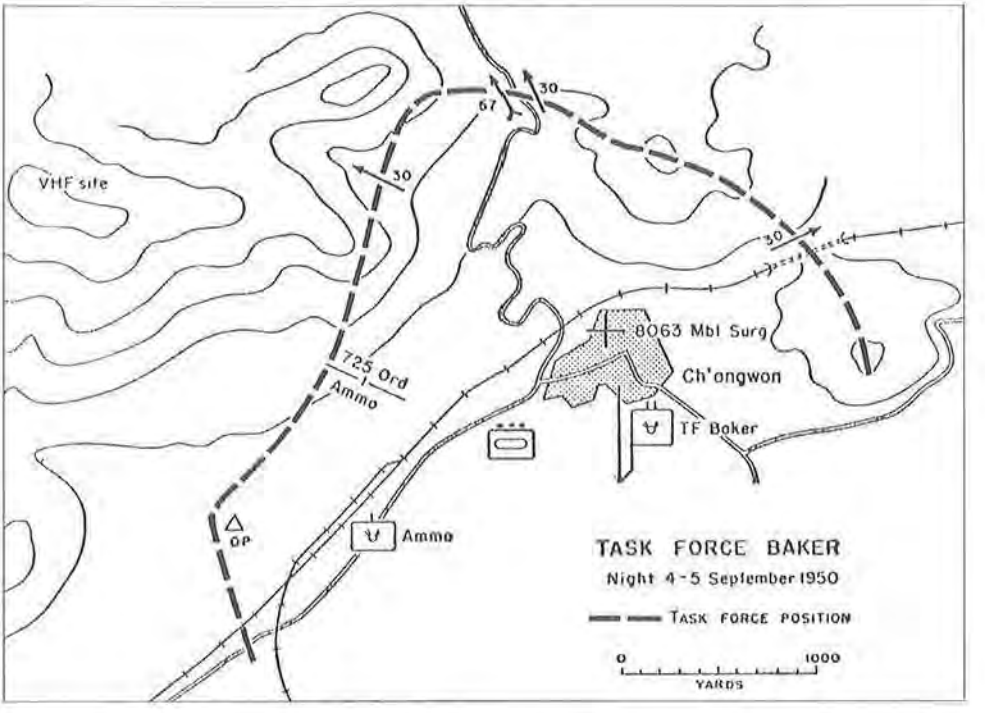
I had already planned my dispositions, and in the next forty-five minutes the platoons were spread in a semicircular perimeter extending from the ammunition dump on the west to a hill east of the hospital. The two most critical points in the area were given particular attention. I ordered a machine gun placed to fire northwest in a draw that was the easiest and most likely approach. At the point where our perimeter crossed an important north-south road I directed that another machine gun be posted, reinforced by the rocket launcher, and that an officer be there at all times. Radio communication from my CP to each of these platoons was established.

As these dispositions were being made, I went to the hospital and took charge of an engineer platoon that was indifferently providing the close-in security. I informed the engineer lieutenant of the formation of the task force, and directed him to tighten up his defense of the hospital.

Next, I visited the ammunition supply point and told the commander of the ammunition company of the situation. I directed him to form a security screen extending from the left flank of the ordnance position to well beyond his own installation. I also ordered him to place an observation post in a draw on his left flank. After this, I tested communications.

During the night an artillery officer called me and said he couldn't get any ammunition. I asked why. He replied, "They just won't issue it." I went to the ASP.

As I approached the railroad station that served as a CP, I met no guards but found waiting ammunition trucks lined up bumper to bumper. In the CP building I found the commander and all his men. This officer was scared, and his attitude



had infected his troops. Although fifty carloads of ammunition sat in the marshaling yards, the commander would not allow any lights in the area and no identification or loading could take place. Under my direction the captain sent out the security force I had ordered earlier, and then I started him issuing ammunition. We had to take some risks, since we needed the ammunition.

During the night a tank platoon joined our task force. I split this and put half of the tanks in bivouac near the hospital and the others near the ammunition company. Toward morning we were further reinforced by a battalion of ROK marines who arrived from the Chinhae area.

We had one incident during the night. I had been informed that a civil affairs detachment and some engineers were working north of us, and that they had not returned to the division area. Early in the evening a number of these people were challenged, and then came through our roadblock. We assumed all had returned. Later in the night a jeep came along the road but did not halt when challenged. The roadblock officer was a former infantryman, and he fired toward the jeep with his M1 as it came on. As the jeep sped by he grabbed two of the passengers and hauled them out. The jeep soon halted, and we learned he had wounded the local chief of police. I ordered him taken to the hospital, but he died from loss of blood on the way.

The following morning the division's reconnaissance company arrived and, as agreed, Captain Torman took charge. The division's ordnance company, the ammunition company, and the engineer detachment held fast while the tanks encircled

the enemy and the recon company and the ROK marines moved into the area on foot. At the location of the VHF Station the enemy put up strong resistance, using machine guns and mortars. Two American soldiers were killed, but I don't know the casualties among the ROKs. Seventeen guerrillas were captured or killed, including three women. The rest just melted away.

Had the reconnaissance company not arrived when it did, the 725th Ordnance Company would have swept the area. Still, the ordnance company's importance in providing security for the hospital, the ASP, and the MSR should not be underestimated. It maintained the security until an adequate offensive force arrived. In so doing, the company showed that well-trained technical troops can be of decisive importance during critical periods.

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Cooperative Logistics in Korea

Introduction. Capt. Richard A. Johnson, then an observer for the Quartermaster General, briefly describes his mission to determine the degree of acceptance of U.S. Army clothing, equipment, and rations by United Nations troops during the Korean War. He thus provides some insights into the difficulties of cooperative logistics, even when one nation (the United States in this case) is the primary supplier.

My primary mission was to determine the degree of acceptance of Quartermaster Corps clothing, equipment, and subsistence items by United Nations troops in the Far East Command other than those of the United States. I visited troops from Turkey, the Philippines, Thailand, the United Kingdom, Australia, New Zealand, Canada, India, Norway, Sweden, Belgium, and some forces of the Republic of Korea.

There is an expression in Korea that if anything is "tops"—if it is really good—it is called "Number One." When talking to UN soldiers, I asked how they felt about U.S. clothing, equipment, and subsistence. They answered, "It is Number One." But we know there is still room for improvement on everything we have.

First, I will talk about subsistence. The remark was made to me several times that no army has been as well fed as Eighth Army in Korea. I think the Quartermaster Corps deserves a hand for the amount of food being supplied and the way it is prepared.

In my opinion, the U.S. rations are suitable for all UN troops with minor changes, except for Oriental troops. The Turks will not eat pork, and the Greeks delete sweet potatoes, corn, peas, and other items. Most European soldiers draw additional bread, and those from Mediterranean areas draw vegetable oils and olives. Some of the extra issues are made from U.S. stocks, and others are shipped to them from their own countries. The Greek Government, for instance, ships olive oil to Pusan. It is then forwarded with the regular rations to the division supplying

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Reproduced from Richard A. Johnson, "UN Approval of U. S. Products," in John G. Westover, ed., *Combat Support in Korea* (Washington, D.C.: U.S. Army Center of Military History, 1987), pp. 169–71.

the Greeks. These supplementary foods are not a problem that need worry us in the United States unless we feed a much larger number of UN troops.

Our rations are not suitable for Oriental troops because their basic food is rice. If they get rice they are happy. Anything else they draw merely supplements the rice portion of the meal. If you give them a fine steak, they cut it up and boil it with rice, so I don't see the necessity of issuing them steak when they are going to cook it in that way. I feel some work should be done to develop a menu for Oriental troops if we are to continue to supply them. Start from scratch, find out what they like, and issue that instead of the U.S. menu plus rice. In our present system a lot of items are wasted.

A special operational ration has been developed for the South Koreans called the 12-in-1, or J, ration. It is made in Japan. The Korean soldiers like it; however, like all combat rations, it becomes tiresome when eaten over long periods.

No particular difficulty is found with the package marking. At first, when a Turkish soldier got a can of U.S. food, he wouldn't know what was in it. However, after using a particular item for a month or so he learned to associate the writing on the can with its contents. So, if the troops are going to use an item over an extended period, there will not be any particular difficulty with markings.

Next, I will discuss clothing and equipment. I am not blowing the Quartermaster Corps horn by saying everything the U.S. has is the best in the world. But the U.S. items are generally of better design and of better quality than those manufactured in other UN countries represented in Korea. For that reason, the UN troops prefer the American items. The Turks, in speaking of many items will say, "We like the U.S. item because it is more convenient to use." In other words, our design is better.

The main difficulty with U.S. clothing for UN troops is sizing. The Turks and Greeks are about the same size as American soldiers except that their feet are quite a bit wider. Oriental troops are smaller than the average American soldier and their feet are small but wide.

So far as equipment is concerned, many of the UN troops are not mechanically inclined or have not worked with mechanical equipment. For example, Thai officers say that many of their soldiers come from farms and have never used anything mechanical. They probably have been following a plow all their lives—and a wooden plow at that. So you will find they have difficulty with what we consider simple mechanical items such as the immersion heater, the Coleman lantern, and the fire unit. Rather than go through the ordeal of setting up the immersion heater, they go down to the nearest stream and wash their mess gear.

Many UN troops do not understand the layer principle as we apply it to our winter clothing or, if they do understand it, they don't agree with us. They told me they like American equipment because of its lightness, but they felt that for warmth they should have much heavier clothing—something that will keep out the cold. They don't believe that two layers of light clothing keeps out the cold much better than one heavy layer.

As much as the UN soldiers like to wear the U.S. uniform, when they go on leave to Japan they want to be known as Turks, or Greeks, and not as U.S. soldiers.

They are, however, very proud of their association with a U.S. division, and will wear the shoulder insignia of their own country on one shoulder, and that of the U.S. division on the other.

I want to mention that I think the United States Army has forgotten that the American soldier is also proud of the fact that he is an American soldier. Many American soldiers in Korea remarked, "Why doesn't the United States Army have a uniform of its own—a uniform that every Tom, Dick and Harry in the world isn't wearing?" So I believe some thought should be given to *esprit de corps* in the U.S. Army, to give the American soldier a uniform he can be proud of—and that only he will be wearing.

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Logistical Difficulties and Lessons Learned in Korea

Introduction. Lt. Col. Charles R. Scherer, Assistant G–4 of the 7th Infantry Division during the Korean War, offers a personal summary of supply operations in Korea. His observations, drawn from the experience of the 7th Infantry Division, provide a valuable overview of the logistical difficulties and lessons learned in Korea.

Korea made several things very obvious. We had forgotten many of the lessons of mobility and small detachment operations learned in World War II, and we had to relearn them. We found that units must expect to serve more troops and work with less corps and army support than Quartermaster Corps doctrine prescribes. Above all, we learned about distance.

The occupation of Japan prevented normal training. Under-strength battalions and regiments were scattered in small garrisons around the islands. Regiments maintained separate posts and S4s operated the combined technical services. Commanders forgot that division would normally provide most of their supplies and services. Once the dependence on S4s was formed, it was hard to break.

In Japan some of our technical services were performed by Japanese civilians. This was necessary because of troop shortages and the lack of qualified Army technicians. Our own men were thus prevented from getting the necessary training and experience. This, coupled with inadequate SOPs and field training, prevented the technical service troops on occupation duty from being ready for combat.

The 7th Infantry Division was the last of the occupation divisions to leave for Korea. As the other divisions left, we were levied for personnel and lost many of our key officers and NCOs. This didn't hurt the service troops as much as it hurt the infantry and artillery, but it did lower the efficiency of our division. We were preparing to go to Korea with a strength of about 9,000 when, about three weeks

Reproduced from Charles R. Scherer, "Supply Lessons," in John G. Westover, ed., *Combat Support in Korea* (Washington, D.C.: U.S. Army Center of Military History, 1987), pp. 184–86.

before our departure, we received 10,000 American and 8,000 Korean replacements to integrate into our division.

The Koreans we received looked as though they had been herded together to get them off the streets of Pusan. They spent their first week in Japan in quarantine, since they had to be deloused and cleaned. Then we had to equip them completely. Japan Logistical Command did a wonderful job of getting the articles of clothing and equipment to us, but it was a real problem to teach the Koreans how to live in a camp.

They could not speak English and we had few interpreters. Our instruction was given primarily by sign language and making simple motions for them to watch and imitate. We had a long way to go in two weeks. These men had no idea of sanitation, let alone the more complicated activities of military life. Yet high-level policy dictated that we treat them as our equals in every respect. They were to receive the same clothing and equipment, the same treatment, the same rations. Later, they even had to have chocolate bars and "comic" books!

We Americans have much to learn about handling troops of the so-called backward nations who may come under our control. They do not understand democracy, our ideals, our methods of discipline, and the forces that motivate our actions. The Koreans have not lived as we have, and our easy-going discipline did not work with them. In their own army discipline was strict, arbitrary, and often brutal. They had been reared under such discipline and seemed to understand no other kind.

The integration of Koreans was unsatisfactory. They ate our rations, rode our trucks, used our supplies. But except for menial tasks, they were a performance cipher.

We lost a great deal of mobility because of our overload of supplies. Our men had too much equipment in Japan and they did not strip down to prepare for combat. Regiments committed the same error. Used to depending on their own S4 sections for garrison supplies, they continued to carry large stocks of clothing and equipment in their own trains. S4s made "deals" in Pusan and carried their acquisitions around in their trucks. At Pukchon we found one regiment hiding three hundred cases of C rations among the men's duffel bags, while the division quartermaster was trying unsuccessfully to obtain operational rations! When the 31st Infantry was overrun near Chosin Reservoir, it lost ten to twenty truckloads of clothing. Critical types of ammunition would be concealed by one unit while greatly needed by another.

During our first six months in Korea, the infantry regiments did not trust the ability of their divisional service units to keep them adequately supplied. Occasionally a regimental commander would test our ability to produce. One regimental commander, while advancing to the Yalu River against moderate resistance, insisted on 50 tons of 4.2-inch mortar ammunition. We figured he didn't need that much, but we piled it right in his front yard so he could see we could deliver it. Unfortunately, we could not evacuate it when we withdrew, and it had to be destroyed. The artillery battalions near the Yalu River requested two extra basic loads of fire to be stored in a division ammunition supply point, and they gave strong arguments for it. I had mental reservations about getting so much heavy

Supplies pile up on the dock at Pusan

ammunition so far forward when resistance was light. When the fighting around Chosin Reservoir forced us to leave our exposed position on the Yalu River, this ammunition too had to be destroyed.

All the hoarding and all the demands for extra supplies took extra transportation at the very time such great operating distances put vehicles in shorter supply. When we first came to Korea, division headquarters could move in 25 trucks, but soon it took 50. Everyone had acquired a Korean desk and chair. Regiments called for 200 additional trucks when they made a move, although movement tables show they should have been able to motorize themselves with a 90-truck augmentation.

Lest it seem our regiments alone were guilty of poor supply discipline, I will point out that some of the patterns of waste were established at the top. Higher headquarters sometimes caused us to overload our units. Once, while inspecting a unit, a general officer found a man who had only two pairs of socks. He ordered that every man in the division carry six pairs! We had to issue these over the protest of commanders who knew that their men would soon throw away the extra pairs. Colonel S. L. A. Marshall (in *The Soldier's Load and the Mobility of a Nation*) is right in his statement that when you overload a soldier you decrease his efficiency. Yet we had pressure in 1950 to draw every piece of impedimenta that the Army designed.

In Korea there were some increases in our loads that were very necessary and justifiable, such as tents and stoves. The extreme cold of northern Korea made it absolutely essential to have shelter throughout the division. It was necessary that

each infantry platoon have a squad tent and stove so it could rotate its men and allow them to get warm. But enough tents for a division certainly complicated our transportation situation.

The distance from army supply dumps to us made it necessary for quartermasters to carry more clothing, shoes, mess gear, stove parts, and other supplies than normal. We tried to get permission to store these stocks in boxcars on sidings, but this was refused.

We usually think of the company or platoon as being the smallest work unit among service troops. In Korea we learned the need to operate in smaller detachments. The quartermasters often had to maintain four or five class I and class III supply points, and maybe two II and IV points. It took a lot of detachments to accomplish this. Typically, one officer and a composite squad would run a small distributing point. The ordnance company sent semipermanent detachments to the regiments because of the distances separating them. Here was a place where leadership was necessary on the part of junior officers and NCOs. We often hear of the need for leadership among combat troops. It is no less necessary among service troops.

The rations in Korea were out of this world. I had more fresh meat in Korea in a month's time than I received in three and a half years of Pacific service in World War II. We also had fresh vegetables in limited quantities. The food was so good that we got few complaints from commanders except about an occasional shortage in Worcestershire sauce, catsup, or black pepper! I doubt if we could have maintained this quality of food were we operating on the scale of World War II.

Chapter 10

Logistics in Vietnam

68

Secretary of Defense McNamara's Management "Reforms"

Introduction. In this article, actually an excerpt from his 1968 book entitled The Essence of Security, *former Secretary of Defense Robert S. McNamara explains his management philosophy and his activities in the 1960s, which were designed to improve organizational efficiency at the highest levels of the American defense establishment. Understanding McNamara's management "reforms" is essential to understanding the logistics of the Vietnam War and higher level management of the Army in the post–Korean War period.*

The challenge of the Department of Defense is compelling. It is the greatest single management complex in history; it supervises the greatest aggregation of raw power ever assembled by man. Yet my instructions from both President Kennedy and President Johnson were simple: to determine and provide what we needed to safeguard our security without arbitrary budget limits, but to do so as economically as possible.

In many respects the role of a public manager is similar to that of a private manager. In each case he may follow one of two alternative courses. He can act either as a judge or as a leader. As the former he waits until subordinates bring him problems for solution, or alternatives for choice. In the latter case, he immerses himself in his operation, leads and stimulates an examination of the objectives, the problems and the alternatives. In my own case, and specifically with regard to the Department of Defense, the responsible choice seemed clear.

The Beginning

From the beginning in January, 1961, it seemed to me that the principal problem in efficient management of the Department's resources was not the lack of

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management authority. The National Security Act provides the Secretary of Defense a full measure of power. The problem was rather the absence of the essential management tools needed to make sound decisions on the really crucial issues of national security.

Two points seem to be axiomatic. The first is that the United States is well able to spend whatever it needs to spend on national security. The second point is that this ability does not excuse us from applying strict standards of effectiveness and efficiency to the way we spend our Defense dollars.

Within that framework, our early studies led us into three major efforts: improvement of our strategic retaliatory forces, increased emphasis on our non-nuclear forces, and a general upgrading of effectiveness and efficiency in the Defense Establishment. For that matter, the first two of our major objectives commanded wide support by the time I took office, as I mentioned earlier.

The third caused considerable controversy. Not that there was much disagreement about the need; for years everyone who thought seriously about the Department of Defense felt that major improvements were needed. The solutions offered ranged from drastic proposals for complete unification of the armed forces to vague suggestions about "cutting the fat out of the military budget." But there was no consensus on just what should be done.

Moreover, there was an additional and inevitable human problem. These reforms would necessarily change traditional ways of doing things, and limit the customary ways of spending Defense money. It is inevitable that people will take more easily to suggestions that they should have more money to spend, as in the improvement of our nuclear and non-nuclear capabilities, than to suggestions that they must spend less or that they must abandon established ways of doing things. Yet the very substantial increases in the budget which we felt necessary added a further strong incentive, if any were needed, to move ahead on these problems of increasing efficiency and effectiveness.

What we set out to do can be divided into two parts: the first essentially a series of management reforms of the kind to be found in any well-run organization, an effort which in large part covered by the formal Five-Year Cost Reduction Program we set up in July, 1962. The common characteristic of such reforms is that they have very little to do with military effectiveness, one way or the other. They merely save money by introducing more efficient methods of doing things.

The second and more important part of the effort did bear directly on military effectiveness. Although dollar savings are sometimes an important by-product, here the essential point was to increase military effectiveness. We found that the three military departments had been establishing their requirements independently of each other. The results could be described fairly as chaotic: Army planning, for example, was based primarily on a long war of attrition; Air Force planning was based, largely, on a short war of nuclear bombardment. Consequently the Army was stating a requirement for stocking months, if not years, of combat supplies against the event of a sizable conventional conflict. The Air Force stock requirements for such a war had to be measured in days, and not very many days at that. Either approach, consistently followed, might make some sense. The two

combined could not possibly make sense. What we needed was a coordinated strategy seeking objectives actually attainable with the military resources available. The fact was that, in the past, so-called requirements bore almost no relation to the real world: enormous requirements existed on paper, often almost entirely disembodied from the actual size and nature of the procurement program.

New Form of Budget

Our new form of budget for the first time grouped together for planning purposes units which must fight together in the event of war. The Navy strategic forces, the Polaris submarines, are now considered together with the Air Force Strategic Air Command; Navy general-purpose forces are considered together with the Army and Marine divisions and the Air Force Tactical Air Command. This kind of reform provides substantial improvement in the effectiveness of our military establishment. Even where it does not lead directly to lower expenditures, it is economical in the true sense of the word; that is, it gives us the maximum national security obtainable from the dollars we do spend. We can imagine many different kinds of wars the United States must be prepared to fight, but a war in which the Army fights independently of the Navy, or the Navy independently of the Air Force, is not one of them. Quite obviously, the coordination of the four services makes eminently good sense on the narrowest military grounds.

The situation becomes more complicated when decisions must be made on requested force-level increases or the development or procurement of new weapons. Adding a weapon to our inventory is not necessarily synonymous with adding to our national security. Moreover, even if we were to draft every scientist and engineer in the country into weapons-development work, we could still develop only a fraction of the systems that are proposed. This process of choice must begin with solid indications that a proposed system would really add something to our national security. The United States cannot even seriously consider going ahead with a full-scale weapons-system development until that basic requirement has been met.

Development Costs

Development costs alone on typical major weapons systems today are enormous. Over a billion dollars were spent on the atomic airplane, which was little closer to being a useful weapon when we canceled it, shortly after I took office, than it had been half a dozen years earlier.

The B–70 bomber also was an example of a weapon which, it seemed to me, failed to meet the basic requirement for a major systems development. It happened to be a particularly expensive weapon, since to develop, procure and operate a modest force of these planes would have cost us at least $10 billion. Yet considering the weapons we already would have by the time the B–70 could be operational, it was very hard to see how this weapon would add to our national security.

In fact, the whole debate on the B–70 tended toward terms which had very little to do with the facts of the situation. There was a lot of talk about missiles versus

bombers. I have no feeling about missiles versus bombers as such. If bombers serve our national interest, then we should be interested in bombers; if missiles, then we should be interested in missiles; if a mix, then we should be interested in the mix. But the B–70 would have carried no bombs. It would have attacked its target with a very complex air-launched missile system from distances of hundreds of miles. The question was not bombs versus missiles. We were all agreed that it must be missiles. The debate was about alternative launching platforms and alternative missile systems. And the particular launching platform and missile system proposed in the B–70 program just was not an effective means to accomplish the missions proposed for it. Despite the enormous controversy and criticism when development was canceled, I think there now is general agreement that the decision was sound.

Complexity and Cost

Obviously one reason for restraint in choosing new weapons systems is their growing complexity. We need to keep the number of new systems as low as possible consistent with security, in the interest of maximum reliability. The efficiency demonstrated by a weapon on a test range may drop sharply under the chaotic conditions of combat. We must avoid putting ourselves in the position of the camera bug who weighs himself down with so much specialized equipment that he actually gets poorer results than a more lightly equipped competitor. And let me add that not only do the proliferation and complication of weapons reduce dependability, but they are major factors contributing to enormous excess inventories of parts and equipment.

What becomes clear, then, is that the question of how to spend Defense dollars and how much to spend is more complicated than is often assumed. A new weapon cannot be viewed in isolation. Anyone who has been exposed to so-called brochuremanship knows that even the most outlandish notions can be dressed up to look superficially attractive. Instead, each new weapon must be considered against a wide range of issues: its place in the complex of missions to be performed; its effects on the stability of the military situation in the world; other alternatives available.

These decisions must be made ultimately with a high degree of judgment, but there is an important difference between the way we went about them and the way they used to be made. Formerly an arbitrary budget ceiling was fixed for national defense and funds were then apportioned among the services. Today we examine all our military needs, in the context of our national security in the broadest sense, and fill them accordingly.

Efficient Management Machinery

Up to this point I have emphasized the general considerations we applied in the Defense Department after January, 1961; the goals we sought and how we set about making the decisions to reach them. As I mentioned earlier, there was no lack of management authority, but we felt sharply the need for more efficient machinery with which to exercise it.

The problem may be considered this way: in order to make crucial decisions on force levels and weapons, the President, the Secretary of Defense and Congress must have complete information focused on those questions and their place in the over-all military system. They need to know, for example, the military effectiveness and the cost of a B–52 squadron as it relates to a Minuteman missile squadron and a Polaris submarine. The data must include not only the cost of equipping these units but also the cost of manning and operating them for various periods. Only under these circumstances can the alternatives be made fully clear.

One of the first things we did in 1961 was to design a new mechanism which would provide this information and integrate it into a single, coherent management system. The product of this effort was the Planning-Programing-Budgeting System, which is now being widely applied throughout the U.S. Government and which is being introduced in foreign governments as well.

For the Defense Department, this system serves several very important purposes:

1. It provides the mechanism through which financial budgets, weapons programs, force requirements, military strategy and foreign policy objectives are all brought into balance with one another.

2. It produces the annual Five-Year Defense Program, which is perhaps the most important single management tool for the Secretary of Defense and the basis for the annual proposal to Congress.

3. It permits the top management of the Defense Department, the President and the Congress to focus their attention on the tasks and missions related to our national objectives, rather than on the tasks and missions of a particular service.

4. It provides for the entire Defense Establishment a single approved plan, projected far enough into the future to ensure that all the programs are both physically and financially feasible.

In short, the new planning system allowed us to achieve a true unification of effort within the Department without having to undergo a drastic upheaval of the entire organizational structure. It would be a shell without substance, however, were it not backed by the full range of analytic support which operations research and other modern management techniques can bring to bear on national security problems. To this end we developed highly capable systems-analysis staffs within the Office of the Secretary of Defense, the Joint Chiefs of Staff organizations and the military departments. These staffs provided the civilian and military decision-makers of the Department with an order of analytical support far higher than had ever been the case in the past. I am convinced that this approach not only leads to far sounder and more objective decisions over the long run but yields as well the maximum amount of effective defense we can buy with each Defense dollar expended.

A Lesson Learned

The creation of the Defense Department stemmed directly from one of the great lessons learned in World War II: that separate land, sea and air operations

were gone forever, and that in future wars the combat forces would have to be employed as teams under unified strategic direction. The National Security Act of 1947 and its subsequent amendments established the Department and shaped its basic mode of operation. Three separate military departments reporting to the Secretary of Defense were retained to train, supply, administer and support the respective land, sea and air forces. However, operational direction of the combat forces in the field was made the responsibility of the unified and specified commanders, reporting to the Secretary through the Joint Chiefs of Staff. Thus, from a functional viewpoint, the Department of Defense has been given a bilineal organizational structure. The operational control and direction of the combat forces extend down through one chain of command, and the direction and control of the supporting activities down through another. While this basic structure proved to be entirely sound and workable, we have found it necessary over the past seven years to make a number of changes in both parts of the organization.

With respect to the first chain of command, it seemed to me that two major deficiencies still remained to be corrected. Some of the combat-ready forces had not yet been placed under the unified and specified command structure. Also, the Joint Chiefs of Staff had not yet been provided the organizational and management tools they needed in order to give the most effective day-to-day operational direction to the combat forces.

Correction of Deficiencies

To correct the first deficiency, we created in 1961 the U.S. Strike Command, putting under a single joint command the combat-ready forces of the Tactical Air Command and the Strategic Army Corps. They previously had been controlled directly by their respective military departments. With that organizational change, all combat-ready forces are now assigned within the unified and specified command structure. The Strike Command provided us with an integrated, mobile, highly combat-ready force, available to augment the unified commands overseas or to be employed as the primary force in remote areas. Moreover, as a result of the improved operational concepts developed under Strike Command and the joint training received, the entire Army–Air Force team is now better integrated and works together more efficiently and effectively than at any other time in our history.

To meet the need for better managerial tools, we carefully reviewed both the internal organization of the Joint Chiefs of Staff and the various support functions. We found that two of the most important services to field commanders—communications and intelligence—were being performed separately by the three military departments with virtually no regard for the role of the JCS in the operational direction of combat forces in the field. It was clear that both of these functions should be brought under the direct supervision of the JCS. But they were too large and diverse to be placed within the Organization of the Joint Chiefs of Staff and too important to be fragmented among the individual unified and specified commands. Accordingly, we decided to consolidate them in two new Defense agencies which report to the Secretary of Defense directly through the Joint Chiefs.

Actions were already under way in 1961 to form the Defense Communications Agency. We expanded its functions to include not only the long-haul communications facilities of the Defense Establishment, but also those required for command and control functions, intelligence, weather services, logistics and administration for all components of the Department. The intelligence functions formerly performed by the three services moved under the new Defense Intelligence Agency.

Several measures were taken to improve the organization surrounding the Joint Chiefs of Staff. A new National Military Command System was created to ensure that the JCS can continue to direct the armed forces under all foreseeable circumstances. Several new offices were added, including special assistants in such diverse areas as strategic mobility and counterinsurgency.

Support Functions

When we looked into the support functions, we found that organization had lagged far behind technological advance. The logistics structures of the military departments simply had not kept pace with the demands of rapidly changing technology. The inefficiencies drew repeated attention and criticism from the Congress, which continually prodded the Department in the direction of a fully unified logistics management. The Defense Establishment, however, had moved very haltingly toward that objective with various improvisations. Our solution was to create in 1961 the Defense Supply Agency. We consolidated into it the eight existing separate managers for common supplies, the manager for traffic management, the Armed Forces Supply Support Center and the surplus property sales offices. Later we assigned additional responsibilities to DSA, including the management of common electrical and electronics items, chemical supplies and industrial production equipment. All this resulted in substantial reductions in inventories and operating costs, plus wide improvements in supply services.

Before we organized the Defense Supply Agency, the various elements of the Department—to cite a typical example—were using slightly different forms for requisitions, no less than sixteen in all. As a result, nearly every time a piece of property was transferred from one part of the Department to another, a new requisition form had to be typed. By the simple expedient of establishing a common requisition form and system, we eliminated literally tens of thousands of man-hours of labor formerly wasted in having clerks retype the forms. Other minor but colorful instances of improvement were the consolidation of eighteen different types and sizes of butcher smocks, four kinds of belt buckles and six kinds of women's exercise bloomers.

In addition to these changes in the support field, many more were found necessary in the three military departments, particularly in the broad area of logistics management. In the Army the logistics functions of the old "technical services" were merged into a new Army Materiel Command. In the Navy the logistics functions performed by its bureaus were replaced by a Naval Materiel Command. In the Air Force a realignment between the Research and Development Command and the Air Materiel Command resulted in two new commands: the Air Force

Systems Command and the Air Force Logistics Command. We made each of these organizational changes to meet the need for increased efficiency in the procurement and support of new weapons systems, as well as to keep pace with rapidly changing technology.

Manager Management

All these organizational changes were important in the improvement of Defense Department management. But in the end, economy and efficiency in the day-to-day execution of the Defense program rests largely in the hands of tens of thousands of military and civilian managers in the field. How to motivate them to do their job more efficiently, and how to determine whether or not they do so, have always been among the most difficult and elusive problems facing the top management of the Defense Department. Even where poor performance is found, the practical remedies are more limited than one would imagine. The competition for competent management personnel is extremely keen. We had no absolute assurance that the people we could hire would be any better than those we might fire. My task was to devise a management system through which I could mobilize the capabilities of the managers at the lower levels, involve them more intimately in the entire management process, and motivate them to seek out and develop more efficient ways of doing their jobs. And that in essence is the purpose of the Defense Department's Cost Reduction Program.

Since almost three-quarters of the total Defense budget is spent for logistics in the broadest sense of that term, we concentrated our efforts first on that entire process. From various studies, we were able to identify the key areas in which improvements were urgently needed and where the potential for significant savings was the greatest.

The problem was how to organize the effort on a broad continuing basis. We knew that "one-shot" efforts soon played out, leaving behind no real long-term benefits. Finally, we realized that unless the top management itself placed a high priority on the effort, managers at lower levels would soon lose interest in the program.

Five-Year Program

Initially we laid out a five-year program. Some twenty-eight distinct areas of logistics management were carefully delineated and grouped under the three major over-all objectives of the program: to buy only what we needed, to buy at the lowest sound price, and to reduce operating costs. We fixed specific annual cost-reduction goals, and designed a quarterly reporting system to measure progress against these goals. Each service Secretary and agency head was directly to review personally the progress achieved and to report the results to my office. I then carefully reviewed these results myself, and reported on them to the President and the Congress each year.

We consistently tried to apply one basic test: that a reportable savings must result from a clearly identifiable, new or improved management action which actu-

ally reduced costs while fully satisfying the military requirement. I believe that by and large the savings we reported over the years have met that basic test.

Beyond those savings—more than $14 billion during the five-year period—the program has raised significantly the effectiveness of our world-wide logistics system. We have developed new procurement techniques to broaden competition for Defense work and reduce the use of cost-plus-fixed-fee contracts. More realistic standards determine requirements. New procedures ensure maximum use of excess inventories throughout the Department. Special staffs were organized to eliminate unneeded frills from specifications.

With the completion of the five-year program in fiscal 1966, I established the program on an annual basis the following year. We set a goal of $1.5 billion in savings to be realized in three years from decisions to be made in fiscal year 1967. The results have already exceeded our objectives. The current estimate for the three-year period stands now at $2.059 billion.

The management task is never finished, of course, and this is particularly true of cost reduction. Even while old deficiencies are being corrected, entirely new ones appear. The very large savings achieved during the first five years are not likely to be duplicated during the succeeding five years, but there are a number of logistics areas where the opportunities for improvement are virtually unlimited. One in which activity will no doubt continue is the program through which we closed installations we no longer needed. In many cases they simply were surplus; in others consolidation was dictated by sound management. Altogether, we took 967 actions in the seven years, releasing 1,818,000 acres (over 3,000 square miles) of real estate and eliminating 207,047 jobs.

We recognized, of course, that this program could have serious impact on local communities and on our own employees. From the beginning, the Department worked closely with the communities affected, seeking to find other uses for the facilities we no longer needed. We guaranteed every displaced employee an offer of a new job, and guaranteed as well his former salary level for two years when he took a lower paying job.

Summary

These, then, are the sorts of problems, large and relatively small, which fall to the Secretary of Defense. Sharp differences arise as to how much we should spend on defense and where we should spend our marginal Defense dollars. And here is where the responsibility most clearly falls upon the Secretary. At the end, these problems come down always to the same question: What is really in our national interest? Every hour of every day the Secretary is confronted by a conflict between the national interest and the parochial interests of particular industries, individual services or local areas. He cannot avoid controversy in the whole range of issues which dominate the headlines if he is to place the interest of the many above the interest of the few. And yet it is the national interest, above all, which he has sworn to serve.

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The Logistics Environment in Vietnam

Introduction. Lt. Gen. Joseph M. Heiser, Jr., Commander of the 1st Logistical Command in Vietnam, describes the early planning and execution of logistical support for the buildup in Vietnam in 1965. He focuses on the theater level and outlines the principles on which the logistical buildup in Vietnam was based as well as the constraints which affected logistical planning.

To understand the problems and conditions that characterized the logistical effort in Vietnam, one must keep in mind the sequence of events during the early buildup period. The speed and magnitude of the escalation of U.S. combat troop deployments in response to enemy action and pressure proceeded faster than a logistic base could be developed to support these units. The Republic of Vietnam had a low level of industrialization. Modern logistic facilities were limited or nonexistent. The in-country logistic system supporting the South Vietnamese Armed Forces was incapable of supporting major U.S. forces. The small, highly fragmented system supporting the U.S. advisory effort could do no more than provide the skeleton for a later logistical system. The enemy controlled the major part of South Vietnam, either by direct occupation or through terror tactics. The principal terrain features as well as land and water arteries were either under enemy control, or subject to the constant threat of interdiction.

Logistics planning was further complicated by the fact that logistic troops and units were deployed at about the same rate as tactical forces rather than in advance of them as desired for the timely establishment of an adequate logistic base. The chronology of U.S. unit arrivals in the Republic of Vietnam shows a continuous inflow of detachment- and company-size logistical support units during practically every month of the period spring 1965 to summer 1966. In addition, logistics units were deployed on a Technical Service basis (Table of Organization and Equipment) whereas the new Combat Service to the Army doctrine had already been approved, thus causing much agony. Meanwhile, major

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Reproduced from Joseph M. Heiser, Jr., *Logistic Support*, Vietnam Studies (Washington, D.C.: Department of the Army, 1974), pp. 8–27.

tactical forces, to include the bulk of the 1st Infantry Division; the 1st Cavalry Division (Airmobile); the 173d Airborne Brigade; the 1st Brigade, 101st Airborne Division; and the 3d Brigade, 25th Infantry Division (which was later to become the 3d Brigade of the 4th Infantry Division) were in-country and engaged in battle by January 1966. The major part of the 25th Infantry Division had arrived by April of that year and brigade-size elements arrived practically every month during the period August–December 1966, to include elements of the 4th, 25th, and 9th Infantry Divisions, as well as the 11th Armored Cavalry Regiment, and the separate 19th and 199th Light Infantry Brigades. The remaining brigade of the 9th Infantry Division arrived in January 1967. Meanwhile, further deployment decisions were made, and the Americal Division, the 101st Airborne Division (-) , and other units appeared in Vietnam during the period September 1967 to March 1968.

Logistic Concept (1965) and In-Country Planning

As early as 1962, the need for a centralized U.S. logistical organization in South Vietnam was foreseen by Commander U.S. Military Assistance Command, Vietnam, Lieutenant General Paul D. Harkins. The proposal was disapproved, however by Commander in Chief U.S. Army Pacific and Commander in Chief Pacific, who felt that the requirement was not justified at that time. The idea was revived in August 1964 by the Military Assistance Command, Vietnam, J–4, who believed that the current and future situation would require a logistical command to support activities in South Vietnam. Accordingly, he saw that a plan was prepared which included the prompt introduction of a logistical construction capability. On 21 December 1964, the Joint Chiefs of Staff endorsed the Military Assistance Command, Vietnam, plan and recommended that 230 men be initially dispatched to South Vietnam to form a logistical command as soon as possible. Secretary of Defense Robert S. McNamara approved the plan in principle, but stated that additional justification was needed, particularly for the engineer construction group. However, he felt that the subject was of sufficient importance to send a special representative to South Vietnam, and on 31 January 1965, a group from the Office of the Secretary of Defense arrived in Saigon. After four days of conferences, this group recommended the establishment of a logistical command with an initial strength of 350 men. The establishment of an engineer construction group, not recommended initially, was approved in April as planning for a further buildup developed.

On 25 February 1965, the Secretary of Defense approved the introduction of a logistical planning group in the Republic of Vietnam consisting of 17 officers and 21 enlisted men. Colonel Robert W. Duke was enroute to take command of the 9th Logistical Command in Thailand. He was intercepted in Hawaii and ordered to the Republic of Vietnam to take charge of the planning group. He arrived in Saigon on 6 March 1965. The balance of the officers and enlisted men for the planning group arrived in Saigon during the last two weeks of March 1965. On 1 April 1965, the 1st Logistical Command was activated in Saigon by Commander

in Chief U.S. Army Pacific General Order, using the personnel of the logistical planning group as its initial strength.

Prior to this time, logistical support in Vietnam had been fragmented, with the Army providing only Class II and IV items which were peculiar to the Army, Class V items used by the Army aviation units, and maintenance of vehicles, armament, and instrument calibration by a small Direct Support shop in Saigon. The rest of the support was provided by the Navy through Headquarters Support Activity, Saigon because the Navy had been designated as the executive agency responsible for supporting the Military Assistance and Advisory Groups and missions in Southeast Asia.

The mission of the 1st Logistical Command as developed by Colonel Duke and the initial small planning group was, in broad terms, that the 1st Logistical Command would assume responsibility for all logistical support in Vietnam, less that which was peculiar to the Air Force or Navy. This initial mission included procurement, medical, construction, engineer, finance and accounting of all U.S. Army forces in-country, except Military Assistance Command, Vietnam, advisors; and excluded communications, aviation, and military police support which were retained by U.S. Army Vietnam (the Army component command under Military Assistance Command, Vietnam, and over the 1st Logistical Command). Requirements beyond direct support and general support maintenance capability were to be retrograded to Okinawa. Subsequent add-on missions were planned to be put into effect as the capability became available. These add-on missions were to: assume support of Military Assistance Command, Vietnam, advisors from Headquarters Commandant, Military Assistance Command Vietnam, a task accomplished on 1 September 1965, phase-out the Navy supply activity in Saigon—The 1st Logistical Command started assuming Headquarters Support Activity Saigon functions in September 1965, and completed the mission in March 1966—and assume common item support for all U.S. forces in South Vietnam.

The 1st Logistical Command was authorized direct communications with U.S. Army Ryukyu Islands (Okinawa) on logistic matters. Logistic requirements were placed there. After screening, requirements were filled or passed to U.S. Army Pacific. It either filled them or passed them to Army Materiel Command. This proved to be very unsatisfactory due to inadequate electrical communications with Okinawa, lack of adequate stocks and personnel resources in Okinawa as well as U.S. Army Pacific, and the many headquarters in the logistic chain. Through this chain there was a loss in excess of 40 percent of all requisitions submitted in the initial stages of the buildup. A combat area should be able to submit requisitions directly to Continental U.S.[;] Continental U.S. could then direct shipment to the combat area from the nearest source to that area having the required items in stock.

The 1st Logistical Command, in coordination with Military Assistance Command, Vietnam, operational planning, developed its own logistic concept for South Vietnam. The plan provided for two major base depots and five support commands. The seas and rivers were initially to be the main supply routes within

Vietnam. However, a change over to road and rail would take place when the tactical situation permitted. Each support command would provide all logistic support on an area basis and have a 15 day stockage. Depots would have a 45 day stockage. The Saigon Depot would support the Vung Tau and Can Tho Support Commands. The Cam Ranh Bay Depot would support the Nha Trang, Qui Nhon and Da Nang Support Commands.

A two depot concept was considered essential due to the vulnerability of the Saigon River and port to Viet Cong action and the limited port capacity. Vung Tau was considered an alternate to the Saigon port in the event of loss of Saigon or blockage of the Saigon River. Cam Ranh Bay was selected as the other base depot and port due to its excellent deep water harbor, the existing pier, its central location, and U.S. capability to secure the area from Viet Cong attack.

This plan by the 1st Logistical Command was implemented with only two changes; the Marines were landed at Da Nang and, by Commander in Chief Pacific direction, the Navy was given the responsibility for both tactical and logistical operations in I Corps. The Da Nang Support Command was eliminated from the 1st Logistical Command plan. It was reinstated in 1968. The anticipated scale of tactical operations in the Delta area of IV Corps did not materialize, so the Can Tho Support Command was not activated. The IV Corps was supported by the Vung Tau Support Command by sea and air.

The original plan for the refinement of a logistical plan in an orderly fashion followed by a deliberate and orderly implementation never came to pass. Instead it quickly turned into a concurrent planning and implementation process. The Secretary of Defense approved at the 9–11 April 1965 Hawaiian Conference an Army Combat force of over 33,000 troops with the first combat troops (173rd Airborne Brigade from Okinawa) to arrive in South Vietnam on 21 April 1965. This was just the beginning of the accelerated buildup. After the April conference there were a series of other force level planning conferences in Hawaii, at which Military Assistance Command, Vietnam, would request forces that were required. However, the number of troops approved by the office of the Secretary of Defense was always less than the number requested by Military Assistance Command, Vietnam.

U.S. Forces were built up in an imbalanced manner. Continued enemy pressure on the beleaguered government of South Vietnam and manpower ceilings combined to cause the logistics base to be inadequate in relation to the total force level.

Each time a new ceiling was established it was announced as a final ceiling and could not be changed. Therefore, all planning for future operations had to be based on this number, including requests by the Office of the Secretary of Defense to Congress for supporting funds. This series of "final ceilings," and the decision not to call up a large number of Reserve Component units, established a pattern of "too late planning," and "too late determination of requirements" that affected every facet of the military establishment from draft quotas to administration, training, equipping, procurement by Army Materiel Command, Defense Supply Agency, and Government Services Administration. This resulted in a drawdown of reserve and project stocks to an unacceptable level.

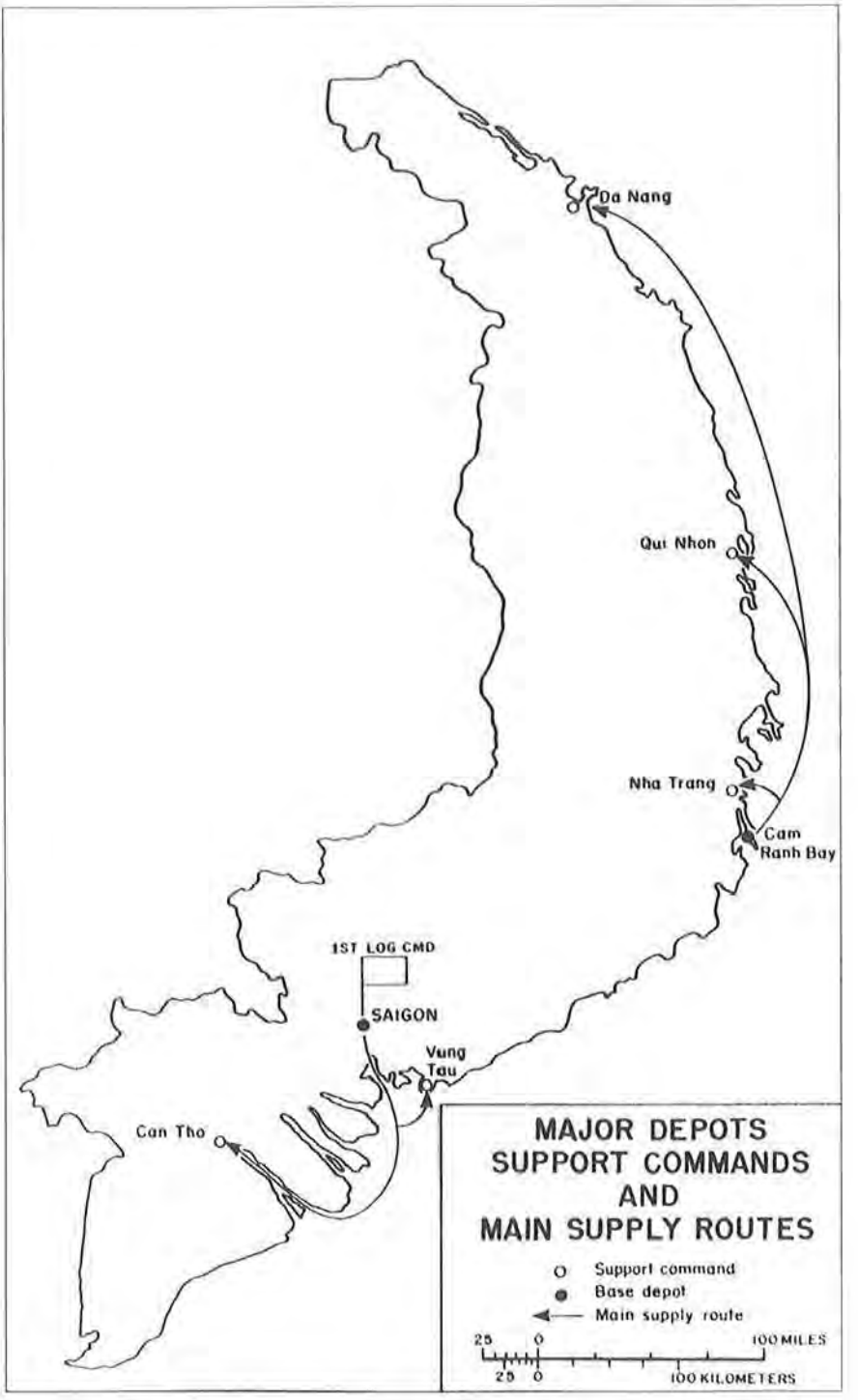
Da Nang
Qui Nhon
Nha Trang
Cam Ranh Bay
1ST LOG CMD
SAIGON
Vung Tau
Can Tho
MAJOR DEPOTS
SUPPORT COMMANDS
AND
MAIN SUPPLY ROUTES
Support command
Base depot
Main supply route
25 0 100 MILES
25 0 100 KILOMETERS

TABLE 1—U.S. ARMY AND TOTAL U.S. MILITARY PERSONNEL IN SOUTH VIETNAM

Date	U.S. Army Personnel	Total U.S. Military Personnel
31 Dec 1960	800	900
31 Dec 1961	2,100	3,200
31 Dec 1962	7,900	11,300
31 Dec 1963	10,100	16,300
31 Dec 1964	14,700	23,300
31 Mar 1965	15,600	29,100
30 Jun	27,300	59,900
30 Sep	76,200	132,300
31 Dec	116,800	184,300
31 Mar 1966	137,400	231,200
30 Jun	160,000	267,500
30 Sep	189,200	313,100
31 Dec	239,400	485,300
31 Mar 1967	264,600	420,900
30 Jun	285,700	448,800
30 Sep	296,100	459,700
31 Dec	319,500	485,600
31 Mar 1968	337,300	515,200
30 Jun	354,300	534,700
30 Sep	354,200	537,800
31 Dec	359,800	536,100
*31 Jan 1969	365,600	542,400
31 Mar	361,500	538,200
30 Jun	360,500	538,700
30 Sep	345,400	510,500
31 Dec	330,300	474,400
31 Mar 1970	321,400	448,500
30 Jun	297,800	413,900
30 Sep	295,400	394,100
31 Dec	250,700	335,800
31 Mar 1971	227,600	301,900
3 Jun	197,500	250,900

*Indicates peak strength in South Vietnam
Between 1954–1960 U.S. Military Strength averaged about 650 advisors

The first US Army combat unit to arrive in South Vietnam (173rd Airborne Brigade) was employed in the Saigon area to insure retention of Bien Hoa Airfield and to assist in securing Saigon. It was initially supported directly from Okinawa by a daily C–130 aircraft flight. Later the support was assumed by the 1st Logistical Command.

The second combat unit to arrive was the 2d Brigade of the 1st Infantry Division. Plans called for their employment at Qui Nhon to secure that area for future use. From the meager logistic resources in South Vietnam some were deployed to Qui Nhon to support that unit. Due to the buildup of enemy pressure on Saigon, Commander, U.S. Military Assistance Command, Vietnam, made the decision two days before the arrival of the 2d Brigade of the 1st Infantry Division that the 2d Brigade would be employed in the defense of Saigon. This resulted in a scramble to relocate the few U.S. supplies and ammunition in South Vietnam from Qui Nhon south some 250 miles to Saigon. Numerous changes were made in tactical plans in the initial stages of the buildup due to Viet Cong pressure. Such changes were necessary, but had an adverse effect on orderly logistical planning and implementation.

As logistical units arrived in South Vietnam they were assigned to appropriate depots or Support Commands as the tactical situation directed. In all Support Commands small units and detachments arrived ahead of the command and control units. As a result officers from the seventeen-man officer staff of the 1st Logistical Command had to be sent to the Support Command areas to receive, organize, assign missions, coordinate efforts, and command these small units and detachments pending arrival of a command and control headquarters. As an example, a U.S. Army major with a jeep and a brief case was the complete command and control unit for the Saigon area. This included finding and securing living areas and work areas for arriving units. Prior to June 1965, the 1st Logistical Command operated on a very thin shoestring. As more staff officers and command and control units arrived in June the command and control situation improved greatly.

On 11 May 1965, the Commander U.S. Military Assistance Command, Vietnam, and his staff were briefed on the logistic plans of the 1st Logistical Command. This briefing included real estate requirements and requirements for tactical troops for depot and support command areas at Qui Nhon, Nha Trang, and Cam Ranh Bay. The plan was approved on 12 May 1965. The first ship unloading operation at Cam Ranh Bay took place on 15 May 1965. Since Army stevedores had not yet arrived in South Vietnam, and the South Vietnam stevedore union refused to send civilian stevedores to Cam Ranh Bay, the first ship was unloaded by a U.S. transportation lieutenant and a small group of enlisted men assembled through levies on units for anyone with any stevedore or small boat experience. From such a start Cam Ranh Bay was built up to a major and efficient port.

With the arrival of combat forces and the 1st Logistical Command becoming operational, its small staff could not accomplish all the planning that was required. A request was placed on U.S. Army Pacific for assistance. U.S. Army Pacific then provided five officers on a 90 day temporary duty tour. These officers reported to the 1st Logistical Command on 23 April 1965 and were given the task to make a study of the Qui Nhon enclave, Nha Trang enclave, and the Cam Ranh Bay area, to determine the tactical security requirements and the feasibility of utilizing these areas as included in 1st Logistical Command's concept, and to refine the logistics planning for each area to include base development.

These planners prepared a study which proved to be of great value in base development and the expansion of the 1st Logistical Command's capabilities. This study with appropriate recommendations and requests for tactical troops for security of desired areas was presented to the Commanding General U.S. Army Vietnam and Commander U.S. Military Assistance Command, Vietnam, in May 1965. Approval was received and security was provided as requested at each location, except Qui Nhon. General Westmoreland approved the security plan for Qui Nhon, but due to Viet Cong pressure and a shortage of U.S. forces the implementation of the plan was delayed over a month. Even then the forces available were not able to push out and secure all of the originally planned areas. This left the ammunition depot at Qui Nhon exposed to enemy action.

Upon completion of the enclave study, a new problem faced the planning group. It was recognized that the continued influx of troops into the city of Saigon (10,000 in the next 4 months) would soon exceed its capability to absorb. It was also recognized that usable real estate and facilities were not available in the Saigon area. A threefold mission was given to the planning group: develop a short range plan to absorb the influx of troops into the Saigon area, develop a long range plan that would ultimately move the bulk of U.S. Army personnel out of the Saigon area, and develop detailed plans for the security and logistical development of the Can Tho areas.

A thorough reconnaissance was made and chosen areas were selected. In order to relieve the pressure on Saigon facilities, the Long Binh area was selected for the establishment of a major logistical and administrative base. A master base development plan was prepared which provided areas for all activities in Saigon.

General Westmoreland (who was both Commander U.S. Military Assistance Command, Vietnam, and Commanding General U.S. Army Vietnam) was briefed on the study and approved it in principle, except he elected to move Headquarters U.S. Army Vietnam to Long Binh (Headquarters Military Assistance Command, Vietnam, remained in the Saigon area). The 1st Logistical Command immediately began implementing the study by locating the ammunition depot, hospital, engineers, plus direct support and general support supply and maintenance support at Long Binh. The movement of headquarters type activities was delayed by the requirement for $2 million to develop an adequate communication system in the area and by the time required for installation of the system.

The study on Saigon proved to be of great value. Long Binh became a major installation in the Republic of Vietnam. The study on Vung Tau and Can Tho resulted in the elimination of Can Tho as a support command. The delta area was supported from Vung Tau and Saigon. The Vung Tau portion of the study included plans for the development of Vung Tau as a deep draft port utilizing De Long piers.

Major Logistics Constraints

To the logistician, it is extremely important to have an early decision establishing theater standards of living. These standards should determine the basic

authorization for post, camp, and station property, PX stockage of merchandise, whether base camps are to be constructed, construction standards, the degree of permanency for fixed installations, and utilities and services to be provided. Obviously, such a decision has a tremendous impact on the logistic system. Construction materials alone constituted some 40 percent of total tonnage of materials coming into South Vietnam in 1965 and 1966.

Without such established standards to use as terms of reference, it was impossible to realistically determine requirements for such items as real estate, supply, storage, maintenance, construction, electricity and other utilities, as well as the resultant port unloading capability required. Without such standards, the logistic system has no grounds for challenging requirements placed upon it. Such a decision was never made in the early days of Vietnam. Therefore, every unit independently established its own standard of living, ordering from supply catalogs as if they were Sears and Roebuck catalogs. Commanders desiring to give their personnel the very highest possible levels of comfort and quality of food, requisitioned air conditioning and refrigeration equipment far in excess of that authorized by Tables of Organization and Equipment. This had a mushrooming effect. Requirements for electrical power generating equipment were in turn increased to the point that demand exceeded the capability of Tables of Organization and Equipment authorized equipment. As the requirement for this equipment increased, the numbers of makes and models proliferated (as suppliers of standard makes and models were unable to keep up with the rapidly increasing demands). As the quantities of equipment increased, so did the requirements for repair parts and qualified maintenance personnel. The repair parts were a problem because of the many varied makes and models and the resultant lack of interchangeability among their parts. It was difficult to maintain full Tables of Organization and Equipment authorized maintenance strength much less the numbers of personnel required to maintain the excess equipment. Therefore, because these personnel were not readily available in sufficient quantities, back-up equipment was requisitioned (for emergency use) further burdening an already heavily taxed logistic system. Finally decisions were made on a piece-meal basis on such things as construction standards. But even with established standards, there was flexibility in interpretation. More often than not, the interpretation did not favor the most austere construction or equipment requirements. This not only put a heavy burden on the logistical system, but it also taxed the Continental U.S. troop base which was not structured in numbers or skills to support the construction or equipment installation and subsequent maintenance requirements which evolved from the Vietnam buildup.

War Reserve Stocks

The stocks available in March 1965 were totally inadequate. For example, only one DeLong pier was available while a dozen could have been used. The timely availability of these piers would have saved the government large sums of money in ship demurrage and speeded up the buildup of forces.

Logistical Management Organizations

Logistical management organizations were not available. As an example, it was a year before a supply inventory control team arrived in South Vietnam. By the time it had become operational, its equipment was found to be inadequate and had to be upgraded. This same situation was common in other areas of logistical management. In a new theater of operations under combat conditions, there is a pressing need early in the operation for management organizations to be completely mobile, automated, and self-supporting. Further, these early logistics management organizations and units were Technical Service oriented even though the Combat Service to the Army functional doctrine had been approved. Difficulties were experienced in fitting the Technical Service organizations into the new doctrine that had not been fully tested before Vietnam.

Engineer Construction

As the buildup progressed, it became apparent that the engineer construction program was becoming so large it required a special command to oversee it. In July 1965, the decision was made to deploy an engineer brigade to the Republic of Vietnam, and upon its arrival the engineer construction functions were transferred from the 1st Logistical Command to the Engineer Brigade.

With increased combat requirements, the priority for logistics construction projects declined for a period and the construction of essential port and depot facilities fell behind schedule, adversely affecting the capability to handle incoming troops, equipment, and supplies. However, in December 1965, Commander in Chief Pacific directed that the highest priority be given to port and beach clearance and depot construction. After this the capability to handle incoming cargo steadily improved.

Logistic Support Principles

The organization for supply support followed the area support, "logistical island," concept with the sea being the main supply route. Field depots were established in each support command to receive, store, and issue Classes II, IV, VII and IX items, less aviation, avionics, medical, and missile peculiar items. The depots provided area support as indicated below:

1. The 506th Field Depot, Saigon (later US Army Depot, Long Binh) was responsible for III and IV Corps.

2. The 504th Field Depot, Cam Ranh Bay (later US Army Depot, Cam Ranh Bay) was responsible for the southern part of II Corps.

3. The 58th Field Depot, Qui Nhon (later US Army Depot, Qui Nhon) was responsible for the northern part of II Corps.

4. The US Army Field Depot, DaNang was established on 25 February 1968 with the mission of supplying Army peculiar items in I Corps. This depot operated as a field depot of the Qui Nhon base depot.

Virtually all Army tactical operations received logistics support from 1st Logistical Command elements operating logistical support activities located at major base camps such as Tay Ninh, Bearcat, Phuoc Vinh, Can Tho, Pleiku, An Khe, and Chu Lai. When forces beyond the reach of these facilities required additional support, temporary forward support activities were deployed.

Initially, medical services and medical supply were organic to the 1st Logistical Command mission. As the buildup progressed, the magnitude of the medical mission became greater. A decision was made to transfer this function from the 1st Logistical Command to a medical brigade. The 44th Medical Brigade assumed this function upon arrival in South Vietnam in 1966.

Aviation logistic support was initially provided by the U.S. Army Support Command, later U.S. Army Vietnam. The 34th General Support Group (aviation supply and maintenance) was deployed to South Vietnam in mid-1965 to manage this function.

The Logistical Support Activity was a continuing provisional activity composed of 1st Logistical Command elements and generally located in a fixed base camp to provide direct and general supply, maintenance, and service support to U.S. and Free World Military Assistance Forces on an area basis. The type and number of units comprising a Logistical Support Activity was dependent upon the scope of the support mission. Many of these operations involved substantial portions of either a supply and service battalion, direct support maintenance battalion, or elements of both with the senior officer present serving as the Logistical Support Activity commander. Stockage levels of all classes at a Logistical Support Activity were determined by the densities of personnel and equipment supported, considering replenishment capabilities. Stockage objectives for the various classes of supply varied from 5 to 45 days depending upon the commodities being stocked.

A Forward Support Activity was a provisional organization, temporary in nature, and deployed in the vicinity of a supported tactical unit's forward operating base to provide direct supply, maintenance, and service support. It was deployed to support a specific tactical operation, when the tactical organic support capability was not sufficient to provide the support required. Upon completion of the operation, it was withdrawn from the area of operations, and its assets and personnel returned to their parent unit. Personnel and equipment comprising a Forward Support Activity were drawn from Tables of Organization and Equipment and Tables of Distribution and Allowances units assigned to the parent Support Command of the 1st Logistical Command. Forward Support Activities could stock Class I, III, V, and limited, fast moving Class II and IV, if the tactical unit was unable to provide their own support. Stockage levels were set at a minimum level consistent with operational requirements (based on troop and equipment densities, resupply rates, capacity and consumption experience). Throughput was used to the maximum extent possible to replace stocks consumed at Forward Support Activities. Maintenance and services were provided as required depending upon the supported unit's organic capabilities, tactical deployment, and densities.

If a Forward Support Activity became a continuing activity, it was usually redesignated as a Logistical Support Activity. Normally, a Forward Support

Activity which continued operations over six months was redesignated as a Logistical Support Activity.

The concept of using a Forward Support Activity to provide combat service support was developed due to the particular environment in South Vietnam and the manner in which tactical units operated. Brigade-size units were engaged in search and destroy operations which in many cases were conducted in areas located a considerable distance from their base camp and major support installations.

The 1st Logistical Command did not have separate authorization for the personnel and equipment required to operate Forward Support Activities, although the need for such authorization existed. Personnel and equipment were drawn from Tables of Organization and Equipment and Tables of Distribution and Allowances units assigned to the parent support command or were provided by the other support commands when the requirement exceeded the parent support command's capability. The initial Forward Support Activity concept envisioned the organization and fielding of Forward Support Activities in support of tactical operations of short duration. Experience showed, however, that some Forward Support Activities were required for extended periods of time resulting in a degradation of the capability of the units from which personnel or equipment were drawn.

Establishment of permanent brigade base camps and the deployment of nondivisional Tables of Organization and Equipment supply, service, and maintenance units to these areas reduced the requirements for Forward Support Activities. In many locations where Forward Support Activities originally provided support, it was possible later to provide logistical support by a Logistical Support Activity with composite support organizations providing tailored supply, service, and maintenance support on an area basis. Then when brigades were deployed outside of their normal area of operations, in most cases, it was possible for the tactical units to obtain support in their new area from combat service support units in that area. When required, augmentation of Tables of Organization and Equipment support units in forward areas enabled a direct support maintenance battalion, for example, to provide across-the-board logistical support to all divisional and nondivisional units in its area of responsibility. Although the requirement for operation of Forward Support Activities was significantly reduced, each Support Command maintained on-call a Forward Support Activity (by specifically designated personnel and equipment) capable of rapid deployment when a Forward Support Activity was required by tactical units. The implementation of the Forward Support Activity and Logistical Support Activity concept enabled tactical commanders to concentrate on their primary mission while ranging deep into enemy territory. These commanders knew that the required logistical support would be available whenever and wherever required.

As the buildup progressed, the technology for the management of supplies improved and new and imaginative concepts and procedures were developed. The period 1965–1966 was characterized by fifteen months of unprecedented growth and development. Inheriting a fragmented logistics structure consisting of some 16 different systems managed by separate component services, U.S. Army Vietnam and the 1st Logistical Command pulled these systems together to form a unified

structure. However, even then it was not feasible to combine all aspects of support into one command. In this period, the 1st Logistical Command managed all logistics and support functions for U.S. Army Vietnam except for aviation supply, maintenance support, and engineer construction. The logistics island concept and Logistics Support Activity and Forward Support Activity support concepts were developed, and three major support commands were established at Saigon, Cam Ranh Bay, and Qui Nhon. Major port and depot construction was undertaken in each area to support the hundreds of thousands of combat and logistics troops entering the country. In late 1965, the control of stocks in storage and on order was accomplished by a laborious manual process. Each depot was considered a separate entity and requisitioned replacement supplies directly through 2d Logistical Command in Okinawa. Under this system, there was no practical accountability of total in-country supply levels. In less than three years, this process was replaced by a complex control system involving the large-scale use of electronic computers. Coincidentally, procedures were evolved to provide continuous and up-to-date inventory accounting of all stocks within Vietnam. In late 1967, a fully automated central inventory control center was established at Long Binh (handling all type of supplies, except ammunition, aviation, medical and special forces items) , and was known as the 14th Inventory Control Center.

Modern computer equipment was installed in the 14th Inventory Control Center to attempt to bring some order to the supply chaos in the depot stock inventory. The major problem encountered was the tremendous influx of supplies which were over the beaches and through the port flooding the depots under a massive sea of materiél and equipment much of which was unneeded. Push supplies and duplicate requisitions of thousands of tons of cargo piled up in the depots, unrecorded and essentially lost to the supply system. In the latter part of 1967, control was slowly established over the requisitioning system through the use of automation and the flow of unneeded supplies abated somewhat. Through these improvements in control and accountability, in-country requirements could be tabulated, interdepot shortages and excesses balanced, and requisition priorities evaluated.

Port Situation in Vietnam

In the pre-buildup stage, most cargo destined for Vietnam was shipped directly from Continental U.S. depots and vendors to west coast military sea or aerial ports. From these ports it was loaded aboard ships or aircraft and moved either to Vietnam directly or to Okinawa which provided backup support. Cargo shipped directly to Vietnam, for the most part, was initially received at the Saigon water port or the Tan Son Nhut airport. Military cargo was treated very much as commercial or Agency for International Development cargo, with little emphasis on specialized development of surface or air distribution methods, facilities, or equipment.

Between mid-1965 and late 1966, cargo continued to move primarily by ship. Airlift was used to move the great majority of troops and priority cargo, which

accounted for only a small part of the total tonnage moved. Surface cargo, during this period, continued to flow to Okinawa, Vietnam and Thailand causing multi-port discharging, although efforts were made to direct shipments to the final destination port.

Initially, most waterborne cargo arriving in South Vietnam was received at the Saigon Port, the only port with deep draft piers except for a small two-berth pier at Cam Ranh Bay which had been constructed in 1964 under the Military Assistance Program. The Saigon Port was a civilian port under the management control of the Republic of Vietnam's governmental port authority. It consisted of ten deep draft berths. U.S. Army cargo was unloaded by Vietnamese civilian stevedores at berths assigned by the civilian port authority. Coordination of military cargo unloading and port clearance was handled by the Navy's Headquarters Support Activity Saigon.

When the buildup began, the port continued to operate in this fashion. Headquarters Support Activity Saigon never knew, from day to day how many berths or which berths would be made available to them for the unloading of U.S. cargo. In addition, customs at the Saigon port dictated that cargo discharged from ships be placed on pier aprons to await port clearance by the cargo owner. It was up to the consignee to remove the cargo from the port. Cargo not consigned to U.S. forces remained on the piers for weeks and sometimes months, creating undesirable and crowded working conditions which adversely affected port operations. Repeated efforts to get South Vietnam to clear the piers were unsuccessful. Some of the cargo being received by South Vietnam was U.S. Military Aid equipment which became South Vietnam equipment as it was unloaded. U.S. forces were accused many times of improper port clearance because this equipment was olive drab in color. But such equipment frequently proved to belong to South Vietnam and the U.S. Army had no authority to move it.

The overloaded port facilities and the operational necessity to selectively discharge cargo to get high priority cargo ashore before less urgently required items resulted in excessive ship turn-around time which increased the total number of ships required. This situation was complicated as cargo was manifested by broad categories only, for example, general cargo, making it impossible to locate specific items. Holding the ships for lengthy periods resulted in demurrage charges of from $3,000 to $7,000 per day per ship. Also the inadequate and insecure railroads and highways forced the distribution system to rely heavily on shallow draft vessels for transshipment of cargo between the Saigon Port and other locations, and intratheater airlift between Tan Son Nhut air terminal and other locations. The problem was further aggravated by a shortage of shallow draft vessels both military (LCMs and LCUs) and civilian assets, which were used for offloading cargo from deep draft vessels at ports not having adequate berthing facilities for the larger ships. Civilian lighterage as well as military landing craft, primarily LCMs and LCUs were used for this purpose.

The U.S. Army's 4th Transportation Command arrived in South Vietnam on 12 August 1965. It was given the mission of assisting Headquarters Support Activity Saigon in U.S. port operations and assuming that function completely as

soon as possible, which it did in September 1965. In addition, it was charged with providing technical assistance to port and beach operations at Cam Ranh Bay and the support commands being established throughout South Vietnam. As U.S. Army terminal service companies were received, they were initially employed in unloading of ammunition at Na Bhe, the central ammunition receiving point just south of Saigon, and were later employed in Saigon proper. In May 1965, a request was made to the government of the Republic of South Vietnam to acquire the three Maritime Marine piers adjacent to the Saigon port facilities for the exclusive use of U. S. Forces. These facilities were owned by a French shipping firm. This request ran into financial and political difficulties, but was finally approved in December 1965 after the personal intervention of General Westmoreland and the U. S. Ambassador. With the exclusive use and control of these facilities, port operations improved in efficiency and volume. The delay in obtaining these piers plus the shortage of yard and storage space and the lack of a depot structure and accounting procedures prevented the early establishment of adequate port facilities.

Nevertheless, it was apparent that additional port facilities would be required in the Saigon area. The 1st Logistical Command made this known to Commander U.S. Military Assistance Command, Vietnam, who directed his staff to develop plans for the facilities now known as Newport. Construction began on this fifty million dollar facility in early 1966. In April 1967, the first deep draft vessel was discharged at the Newport facility. Also, during this period, several other ports throughout Vietnam were in the construction phase.

By the end of December 1967, the ports in use by the Army numbered 10; Saigon, Qui Nhon, Cam Ranh Bay, Vung Ro, Vung Tau, Cat Lai, and Nha Trang were the deep draft ports; Dong Tam, Phan Rang and Can Tho were the shallow draft ports. These improvements in port capabilities brought about a reduction in the average time a deep draft ship waited for a berth in Vietnam ports from 20.4 days during the most critical period of 1965 to the 1970 average of less than two days.

Warehousing and Storage Facilities

Prior to the buildup, warehouses and storage areas were literally nonexistent, except for limited facilities in the Saigon area. Supplies were scattered in several locations throughout Saigon, all of which were substandard and overcrowded; some were only open storage. At the time the 1st Logistical Command became operational, there was a construction backlog for the troops already incountry. Construction of logistics facilities competed with many other requirements. Since there was never more than $300 million in annual capability to apply against a total theater program of close to $2 billion, the construction effort took almost six years to accomplish.

To initially offset this shortage of facilities, negotiations were initiated with the United States Overseas Mission to obtain 13 Japanese built warehouses with dirt floors and no electrical wiring in the Fishmarket area in Saigon. Three of these buildings were obtained by the end of 1965 and the remaining 10 during 1966. A

contract was also let to construct an added 210,000 square feet of covered storage and to fill an area behind the warehouses that would serve as hardstand for open storage and a troop cantonment area. This area housed the 506th Field Depot until a new depot was constructed in Long Binh in 1968 and the move to the new facilities was completed 1 July 1969.

By way of comparison, the new depot facilities at Long Binh provided 1,869,000 square feet of black-topped hardstand and 1,458,000 square feet of covered storage, whereas the depot facilities at the Fishmarket in Saigon had a total of only 670,000 square feet of covered storage space as late as March 1967.

Additionally, agreement was reached with the United States Overseas Mission on 16 March 1965 to provide and erect some prefabricated buildings owned by the United States overseas mission for use as warehouses in the Qui Nhon, Da Nang, Cam Ranh Bay, Nha Trang, and Saigon areas. These buildings were finally available for occupancy in February 1966, almost one year after the agreement. The same basic situation prevailed at Qui Nhon where substandard and overcrowded facilities were occupied until completion of the new depot at Long My in 1968.

The United States constructed a major depot and port complex at Cam Ranh Bay costing over $145 million, $55 million of which came from Army appropriations. Cam Ranh Bay was an undeveloped area located at an excellent natural harbor which when completed had over 1.4 million square feet of covered storage, 1.2 million square feet of open ammunition storage area, and bulk storage facilities for over 775,000 barrels (42 gallons per barrel) of petroleum products. Construction of this complex was started early in the buildup period when it was envisioned that the main war effort would be along the Cam Ranh Bay–Ban Me Thuot–Pleiku axis. Since the war activity took place to the North (Qui Nhon and Da Nang) and South (Saigon), the depot was not utilized to the degree the planners originally anticipated. As a result, there are some who claim that the war passed Cam Ranh Bay by. When taken in that particular context, there is some truth to the claim.

Even though war activity took place in areas different from those expected, Cam Ranh Bay played an important role in the logistics picture. A U.S. Army Support Command was established there as a major logistical command and control element, the Korean forces were supported almost exclusively from Cam Ranh Bay throughout the time they were in the II Corps Area, transshipping supplies from ocean going vessels to coastal type shipping was accomplished there, and marine maintenance was done there. The excellent and secure ammunition storage areas permitted keeping large stocks of needed ammunition in-country relatively safe from enemy attack and the cold storage facilities permitted fresh vegetables to be brought down from Dalat and stored properly till distributed to our forces. Also having a major storage and shipping facility close to the major air base operated by the Air Force was a distinct advantage. At one time it was planned to move the Headquarters of the 1st Logistical Command there (it was later decided that the 1st Logistical Command and Headquarters U.S. Army Vietnam should remain near Headquarters U.S. Military Assistance Command, Vietnam) and until fairly late in residual force planning, Cam Ranh Bay was going to remain as a major U.S. logistic complex. This too was dropped in favor of the Saigon–Long Binh area.

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Logistics and the Helicopter in Vietnam

Introduction. In these excerpts from his book on logistics in Vietnam, Lt. Gen. Joseph M. Heiser, Jr., Commander of the 1st Logistical Command in Vietnam, highlights the important role played by helicopters in providing logistical support to forces in the field and emphasizes the point that the widespread use of helicopters to perform logistical tasks created a significant demand for logistical resources, particularly in the supply and maintenance field, to support the helicopters themselves.

Use of Helicopters in Logistic Support

Significant to operations in Vietnam was the use of helicopters in the logistic support role. Their use freed the Army from a complete dependence on surface transportation. The helicopter became an indispensable link in the forward area of operation because of its ability to operate in virtually any weather condition, day or night, with little or no preparation of landing sites.

The majority of the logistic missions were carried out by UH–1, CH–47, and CH–54 aircraft. The UH–1's and CH–47s were primarily to support the forward areas and delivered such diverse types of cargo as hot food, medical supplies, ammunition, consumable supplies, and repair parts.

The UH–1's operated forward to the platoon level, while the CH–47's transported heavier and more bulky loads to battalions and companies. The CH–54's were primarily employed to lift larger items of equipment to otherwise inaccessible locations and for evacuation of heavy lifts from the combat area to the support area. Extensive use was made of the external sling load concept. This required only the time to fasten the load to a cargo hook suspended beneath the aircraft. By employing the sling load technique, it was not uncommon for the CH–47 to airlift 100 tons of supplies a day within a 10 mile radius.

In addition to the daily combat service support and resupply missions, the larger helicopters, the CH–47 and CH–54, developed a major capability in the recovery of other aircraft, vehicles and equipment requiring removal to the rear.

Reproduced from Joseph M. Heiser, Jr., *Logistic Support,* Vietnam Studies (Washington, D.C.: Department of the Army, 1974), pp. 153–56 and 137–41.

Through extensive experience, procedures were developed whereby aircraft and other equipment and matériel could be rigged for pick-up by helicopters in a matter of minutes, even in enemy territory under fire. To date, helicopters have accounted for the recovery of over 10,000 aircraft, belonging to all of the services, valued in excess of $2.5 billion.

Aerial Resupply

To test the feasibility and effectiveness of an intensive aerial resupply campaign, Operation Task Force Remagen was formed and a test of aerial resupply was conducted during the period 16 March through 29 April 1969. Task Force Remagen was conducted by troops from the 1st Infantry Brigade, 5th Infantry Division (Mechanized).

The Task Force was composed of an armored battalion and a mechanized infantry battalion cross-reinforced, with the mission to prove or disprove that an armored and mechanized force could operate effectively over extended distances without a ground line of communication. For 47 days Task Force Remagen operated at a distance of between 40–60 kilometers from its base at the U.S. Marine Corps Vandergrift Combat Base, and relied entirely on helicopters for resupply.

Requests for supplies and repair parts were forwarded to the Forward Support Element, who in turn forwarded the requests to the 75th Support Battalion Logistic Operations Center at Quang Tri. The requested supplies were assembled overnight and either flown or sent by convoy the next morning to the Forward Support Element for further delivery to the task force by air.

Both battalions involved in the task force maintained combat trains consisting of tracked maintenance and resupply vehicles. All replacement parts were flown to the units in their field locations, exchanged for the defective part and installed on the spot. Defective parts were then returned to the support element for repair. Over 1000 tons of cargo were moved by helicopters from the forward element supply base at Vandergrift Combat Base during the course of the operation.

During this operation the task force received an average of thirteen helicopter sorties per day. It was estimated that with an average of thirty minutes per round trip, four helicopters could have met Task Force Remagen's average daily resupply requirements.

Looking to the future, a project known as Log Lift has been established to incorporate current and future helicopters into the logistic system in order to help in carrying out the aims of the *Inventory In Motion* and *Maintenance Support Positive* programs. Under Project Log Lift, the Army will analyze experience gained in Vietnam in order to develop future policy, practices and procedures. Log Lift will also evaluate the use of existing helicopters and will project into the future when the Army plans to have a heavy lift helicopter with a payload of at least twice that of the currently available Chinooks and Cranes. This greater lift capability will reduce requirements for stocking of supplies and equipment in the forward area of the combat zone and will further assist in retrograding equipment and matériel requiring heavy maintenance and returning them to the user in mini-

CH–47 Chinook airlifts supplies to a battalion located west of Tam Ky

mal time; permit ship-to-shore operations any place in the world; and enhance the overall mobility of the Army by providing a logistic support system as mobile as the combat arms being supported.

* * *

Growth of Aviation Logistic Support in South Vietnam

From an austere beginning when two helicopter companies arrived in Vietnam on 11 December 1961, the total number of U.S. Army aircraft increased to 510 by 1 January 1965 and then further increased to a peak of 4,228 by September 1969. When the buildup commenced in 1965, the U.S. Army Support Command Vietnam had one aircraft maintenance and supply battalion (765th Transportation Battalion) to provide backup direct and general support for all Army aircraft in-country. This battalion was located at Vung Tau and consisted of direct support companies and one general support company. The three direct support companies were located at Vung Tau, Saigon, and Nha Trang. They provided backup support for separate aviation companies having their own organic or attached direct support and they provided direct support for small aviation detachments that lacked this capability.

The one general support company was located with the battalion headquarters at Vung Tau. An aviation supply point in Saigon, operated by the aviation detachment of U.S. Army Support Command Vietnam, provided aviation-peculiar supplies for all Army aircraft in Vietnam.

In 1965 the Commanding General, U.S. Army Support Command Vietnam established a committee to devise a plan to support a large influx of Army aircraft. Basic criteria for the plan were that it should provide for one-stop supply and maintenance service, and provide for an expansion of this service commensurate with increases in aircraft densities. Consideration of the operational structure to be supported led to the development of plans for three prime alternative organizations. These were as follows:

1. Aircraft supply and maintenance units integrated in an aviation brigade, which was planned as a control element for all non-divisional aviation activities.

2. Aircraft supply and maintenance units integrated in the 1st Logistical Command, which had been recently activated.

3. A separate headquarters commanding all non-divisional aircraft supply and maintenance units, assigned to the Aviation Brigade, assigned to the 1st Logistical Command, or a separate command under U.S. Army Vietnam.

The decision reached was to establish a separate headquarters under the direct command of U.S. Army Vietnam. This basic organizational structure has operated throughout the Vietnam Era with only one minor variation. Originally, the command was under the staff supervision of the U.S. Army Vietnam G–4. In October 1967, staff supervision was changed to the U.S. Army Vietnam Aviation Officer.

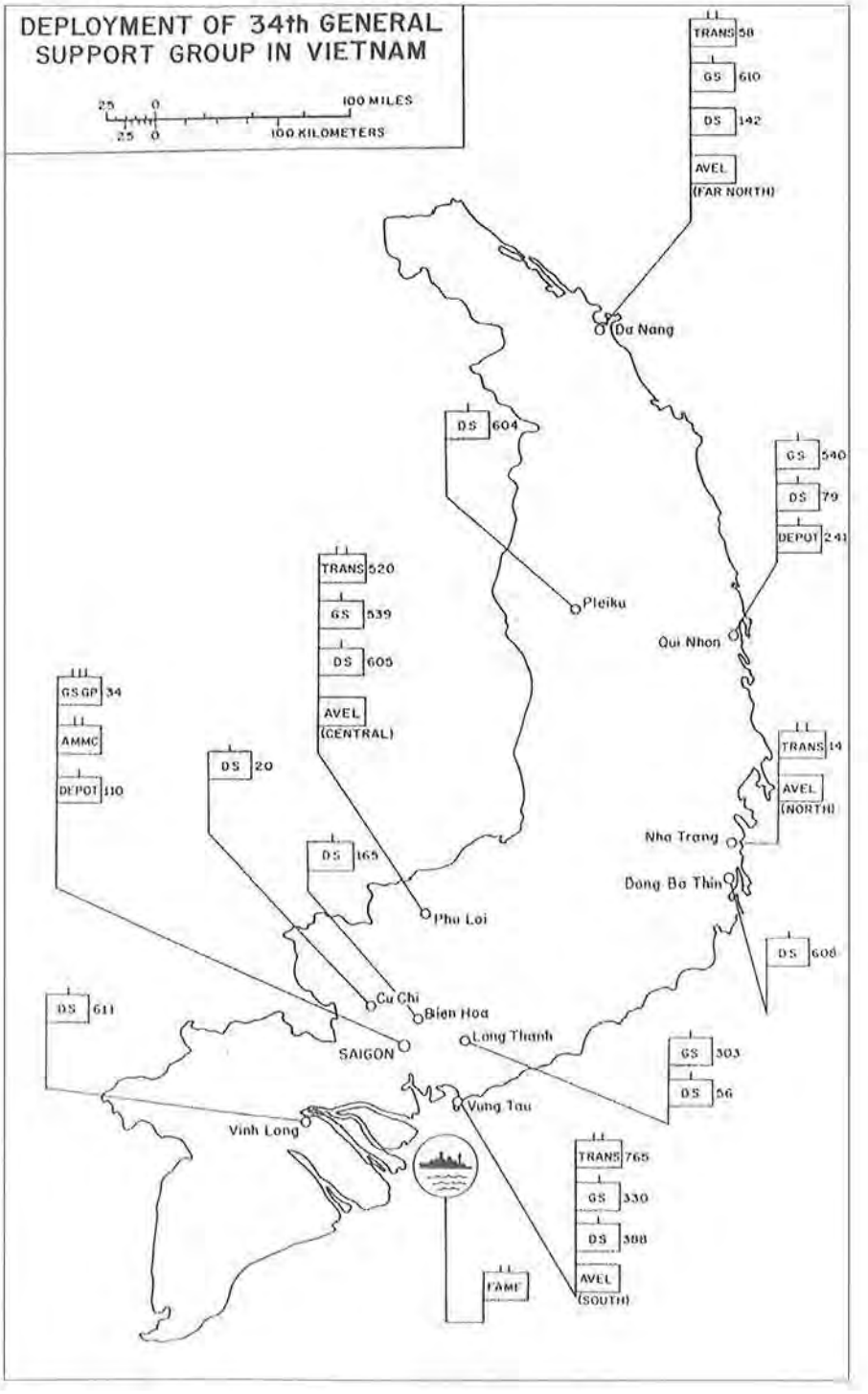
Following the September 1965 decision to establish a separate command, the next two months were spent in developing an organizational structure and preparing the necessary authorization documents. In November 1965, a group headquarters was established on a provisional basis and finally, on 17 January 1966, a U.S. Army Pacific General Order was published activating the 34th General Support Group.

As previously stated, the total Army aircraft density increased to a high of 4,228 in September 1969. The deployed aircraft were assigned to a total of 142 company-sized units plus a number of miscellaneous smaller detachments. Of the 142 companies, 63 were organic to division, brigades, or squadrons and had their own organic direct support supply and maintenance capability. The remaining company-sized units were supported by cellular direct support detachments. The 34th General Support Group provided backup support to these company sized units as well as direct support and general support for all aviation activities in U.S. Army Vietnam.

The 34th General Support Group . . . ultimately had 2 depot companies, 5 general support companies, 11 direct support companies, 4 aviation electronics companies, and the Aviation Materiel Management Center with which to accomplish its mission.

Aircraft Maintenance Personnel

Qualitative personnel problems in supply and maintenance were particularly critical for aircraft because of the nature of the matériel maintained. Civilian con-


DEPLOYMENT OF 34th GENERAL SUPPORT GROUP IN VIETNAM
25 0 100 MILES
25 0 100 KILOMETERS
TRANS 58
GS 610
DS 142
AVEL (FAR NORTH)
Da Nang
DS 604
GS 540
DS 79
DEPOT 241
TRANS 520
GS 539
DS 605
AVEL (CENTRAL)
Pleiku
Qui Nhon
GS GP 34
AMMC
DEPOT 110
DS 20
TRANS 14
AVEL (NORTH)
Nha Trang
DS 165
Dong Ba Thin
Phu Loi
DS 608
Cu Chi
Bien Hoa
DS 611
Long Thanh
SAIGON
GS 303
DS 56
Vung Tau
Vinh Long
TRANS 765
GS 330
DS 388
AVEL (SOUTH)
FAME

tractors were used to augment the military capability in critical skill areas, particularly in the areas of sheet metal and structural repairs. Table 8 shows strength authorizations by fiscal year for contractor personnel.

TABLE 8—CONTRACT MAINTENANCE MANNING LEVEL

Company	FY 65	FY 66	FY 67	FY 68	FY 69	FY 70
Lockheed	—	—	—	100	232	287
Lear Siegler	—	—	457	624	832	733
Dynalectron	34	239	550	847	1056	872
TOTAL	34	239	1007	1571	2120	1892

The Aviation Systems Command provided either Department of the Army civilians or manufacturer's field service representatives to advise and assist in problem areas arising from the operation of complex and sophisticated equipment in the field. In the summer of 1969, 151 field service representatives were authorized. These field service representatives were in addition to the new equipment training teams sent into Vietnam upon introduction of a new equipment item. Project COUNTER team, discussed in another section, were also provided to the 34th General Support Group.

This augmentation with contract labor and the employment of field service representatives and other teams to provide instruction was necessitated, to a large degree, by the fact that there was not an adequate military rotational base in Continental U.S. from which to draw upon for such critical skills as sheet metal and structural repair workers. Because of Vietnam priorities, nearly all first line Army aircraft were located in Vietnam. This further reduced the military experience base. Also, as in the electronics area, trained aircraft maintenance personnel were highly susceptible to incursions from industry, making retention in the Service difficult.

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Logistical Support of the South Vietnamese Armed Forces

Introduction. In this excerpt from his volume in the official Army history of the Vietnam War, historian Jeffrey J. Clarke outlines the logistical support provided by the United States to the Armed Forces of the Republic of Vietnam. Logistical support for the RVNAF was an important part of the American war effort in Vietnam, and here Clarke notes some of the difficulties encountered and how they were overcome, at least in part. Of particular interest are his comments on the provision of M16 rifles for the Vietnamese, an activity which was closely integrated with issue of the then new rifle to U.S. forces.

A Change in Policy

Despite all the public relations hoopla, Westmoreland had not yet planned any new role for the South Vietnamese military. The combined campaign plan prepared in late 1967 differed little from its predecessor regarding the employment of South Vietnamese troops. The division of missions between American and South Vietnamese forces remained unchanged. One of the plan's goals was, in fact, to increase the number of South Vietnamese regular infantry battalions performing local security during 1968. However, the plan was general enough to allow for a flexible interpretation, stipulating, for example, that those regular combat battalions not assigned to the security campaign serve as "division mobile strike forces" and pointing out the need to develop a balanced South Vietnamese logistical system to support extended combat operations.[21] Perhaps feeling that changes in American war policies might be forthcoming, Westmoreland also advised his staff officers to be ready "to adjust our strategy in case there was any change in the nature of the war" and, as a first step, asked them "to develop better ARVN logistics so that . . . [the South Vietnamese] would be better prepared to take care of themselves. . . ."[22]

Reproduced from Jeffrey J. Clarke, *Advice and Support: The Final Years, 1965–1973*, U.S. Army in Vietnam (Washington, D.C.: U.S. Army Center of Military History, 1988), pp. 278–79 and 283–87.

According to American advisers, marked improvements in the area of logistics already were under way. Assisted by U.S. Army port and transportation units, the South Vietnamese finally broke the logjam that had choked the Saigon port since 1965 and put an end to the lines of ships waiting offshore to be unloaded. Newly constructed port facilities also enabled advisers to simplify Vietnamese cargo handling and the transshipment of goods, thus expediting port clearance and freeing warehouse space.[23]

Logistical support of the South Vietnamese armed forces also improved significantly. In October 1967 Westmoreland reported that Saigon could supply 80–90 percent of its ground transportation, 55–60 percent of its sealift, and 20–30 percent of its airlift needs. Because most of the supplies moved by land, the air and sealift deficits did not pose a particularly serious problem, for American support could easily compensate for them. If American materiel, advisory, and training support continued at current levels, Westmoreland believed that the existing logistical system would suffice to support the South Vietnamese military in its present posture.[24]

The effectiveness of Saigon's logistical system in a more mobile situation was another matter. Most South Vietnamese combat units continued to operate at a low tempo from fixed locations near major transportation routes, greatly easing the tasks of their support units and depots. Should the level of combat suddenly increase or the need to conduct large, extended operations in remote areas arise, or should the level of American support decrease, the strain on the logistical system might become intolerable. As a start at improving Saigon's tactical support system, Westmoreland recommended consolidating all division support elements (supply, maintenance, transportation, signal) into a single support battalion.[25] But there was no quick solution. At the other end of the logistical pipeline—in the field and base depots where materiel was stored, maintained, and repaired—many older problems remained unaddressed.

Despite their limitations, Westmoreland slowly began to increase the role of the South Vietnamese in the conventional war effort. During informal talks with Vietnamese leaders in early October, he reflected on the increasing number of American casualties, the sometimes marginal performance of the South Vietnamese forces, and the net effect of all this on American public opinion. All this had to be turned around, and he personally appealed to them to "instill a fighting and aggressive spirit, . . . reduce the desertion rate, . . . achieve significant victories on the battlefield, . . . and, . . . seize the initiative at every opportunity . . . ," reminding them "that God helps those who help themselves." Although the remarks were not particularly new or striking, the fact that Westmoreland later disseminated them to every major American command in South Vietnam gave them more weight. Several weeks later, on the twentieth, following a briefing on South Vietnamese modernization, the MACV commander even declared that "our mission, in essence, is to weaken the enemy, improve the Vietnamese Armed Forces and therefore, make the American troops superfluous." Perhaps Westmoreland was already beginning to consider a withdrawal of American troops—a withdrawal that would not necessarily be preceded by any truce or ceasefire.[26]

* * *

Support for Saigon

The more tangible aspects of improving the South Vietnamese armed forces, the provision of new materiel and equipment, was not without its own peculiarities. Even though the North Vietnamese had not yet introduced tanks, artillery, guided missiles, planes, or ships into the southern battlefields, their lightweight small arms and antitank missile launchers were of recent design and had proved highly successful in combat. In contrast, South Vietnamese infantry, both regulars and territorial, were still using World War II–vintage American weapons. The enemy, Westmoreland charged, had "designed and produced a formidable arsenal of weapons" for the sole purpose of waging "his so-called wars of national liberation." The South Vietnamese "are undergunned and they know it," and "the aggressiveness normally associated with confidence in their equipment is lost." Saigon's soldiers needed modern rifles, machine guns, and rocket and grenade launchers as soon as possible. Current production and delivery schedules were, he complained, "inadequate" and had to be accelerated rapidly. The message was clear. If the South Vietnamese were performing poorly on the battlefield, Westmoreland placed part of the blame on the unwillingness of the Defense Department to supply them with better weapons.[35]

Central to MACV commander's complaint was the delay in providing the Colt M16 automatic rifle to the South Vietnamese forces.[36] An experimental version of the M16 (the XMI6 El) had been used by American units in South Vietnam as early as 1965, and had proved highly successful. The new rifle was not only ideal for the smaller Vietnamese soldier, because of its light weight and small size, but also an excellent weapon for jungle warfare, having a higher rate of fire than the heavier Russian-designed AK47 used by the enemy. In the fall of 1965, when Westmoreland had initially requested 170,000 rifles to equip all American, South Korean, and South Vietnamese infantry battalions (including South Vietnamese ranger and airborne units but not the territorials), the Joint Chiefs of Staff had agreed to only 100,000 M16s, stipulating that American combat forces in South Vietnam be equipped first. At the time the MACV commander replied that 100,000 rifles would "solve immediate problems," but raised his overall request to 179,641, of which 115,436 were for the South Vietnamese units. [37]

Although the Defense Department ultimately approved the 179,641 request, several factors delayed the delivery of M16s to the South Vietnamese troops during 1966 and 1967. First, the steady buildup of American combat forces in South Vietnam increased Westmoreland's requirements for M16s proportionally. A second factor was the limited production of the new rifle. Contributing causes were incremental orders, the manufacturing capability of Colt Industries,[38] the increased expense of either subcontracting production or purchasing the Colt patent, and the desire of the Defense Department to keep costs as low as possible. To these considerations must be added the lower priority given to modernizing the

South Vietnamese armed forces due to the evolving strategy that assigned American forces primary responsibility for offensive combat operations.

In November 1966 the Joint Chiefs revised the M16 distribution plan, giving priority to U.S. combat and divisional support units in South Vietnam, and McNamara himself deferred the issue of the rifles to South Vietnamese units indefinitely. Only at the personal request of Westmoreland and Admiral Sharp in early 1967 did the Defense Department finally approve the distribution of about 8,000 M16s to the South Vietnamese airborne (3,000) and marines (5,000). The first rifles arrived in April and the remainder by the end of May.

In both April and July 1967 Westmoreland restated his requirement for 115,436 M16 rifles for the South Vietnamese, and in August, at the request of the Joint Chiefs, resubmitted it once again, adding 3,000 more for newly created units. Pointing to improvements in "combat effectiveness, morale and aggressiveness" by those South Vietnamese units that had received M16s, he asked that the remainder be given the weapon as soon as possible. According to General Abrams, the MACV commander continued to give the South Vietnamese high priority in September but did an about-face in October, requesting that all American combat support units be equipped with the new weapon (amounting to about 100,000 more M16s) before giving any more to Saigon. Perhaps he feared a public relations disaster if all American units were not equipped first. In October the Joint Chiefs approved an immediate delivery of 5,000 more M16s to the South Vietnamese and in early November finally agreed to honor the total South Vietnamese request, with delivery of the balance scheduled during the first eight months of 1968.[39]

Efforts to modernize South Vietnamese field communications encountered similar delays.[40] In October 1966 MACV prepared plans to improve communications within the South Vietnamese infantry battalions by replacing the older MAP-supplied AN/PRC–10 radios with the more powerful AN/PRC–25s. Westmoreland expected about 3,000 new sets by June 1967 and 28,000 more over the following five years. Saigon agreed to distribute the older models to the Regional Forces and the revolutionary development teams. But the effort lagged. Most new radios went to American troops, and only 2,321 reached the South Vietnamese by November 1967. However, in 1968, after the United States had placed a higher priority on modernizing the South Vietnamese forces, the Defense Department delivered 6,000 new radios in a matter of weeks.

This pattern was repeated for other items of equipment, such as armored vehicles, trucks, artillery, and aircraft. In almost every case MACV had requested moderate quantities of new equipment as early as 1965, but McNamara had repeatedly put off the requests and given priority to American combat units. South Vietnamese requirements, Abrams acknowledged, had "not been handled with the urgency and vigor that characterizes what we do for U.S. needs." Saigon had simply been shortchanged by everyone's reliance on American military might.[41]

Only in late 1967, with the spotlight again fixed on the image and capabilities of the South Vietnamese, did Washington approve the old requests. The only truly new orders were for about 2,500 M60 machine guns and 800 M29 81-mm. mor-

tars to replace similar weapons of World War II–vintage. MACV asked for these items on 21 October, Admiral Sharp's headquarters endorsed the requests on 8 November, and McNamara gave his approval the following February, promising delivery by the end of 1968. As with the M16s, MACV contended that the new machine guns and mortars were lighter, and thus more suitable for the smaller South Vietnamese soldier; would increase his confidence; and, at the same time, demonstrate American concern and support for the Saigon regime.[42] But only Washington's decision to halt further U.S. troop deployments to South Vietnam made the approvals possible.

The South Vietnamese Air Force, Marine Corps, and Navy had similar problems obtaining new equipment. Serious personnel, logistical, and maintenance problems still beset the air and naval components, and their modernization was understandably slow. On 24 October 1967 MACV finally authorized the U.S. Naval Advisory Group to convert the remaining South Vietnamese Marine Corps 75-mm. pack howitzer battery to a six-gun 105-mm. unit (giving them one artillery battalion of six 105-mm. batteries). At about the same time the South Vietnamese Air Force finally converted one of its propeller-driven fighter-bomber (A–1 "Skyraider") squadrons to F–5 jet fighters, and a slightly augmented South Vietnamese Navy coastal command began integrated operations with U.S. Navy vessels. But Saigon's navy still remained largely a collection of riverine craft, coastal junks, and cargo-carrying landing craft, and its air force was woefully short of helicopters. The old American H–34 helicopters used by the South Vietnamese Air Force were no longer in production, loss rates were high, and replacements were scarce. Of 105 helicopters authorized, only 72 were in service in August 1967 and that number was not expected to exceed 77 until January 1969.[43]

Anxious to accomplish some equipment modernization as soon as possible, MACV began to "lend" equipment to the South Vietnamese army. General Johnson had suggested the practice in June 1967, to overcome Saigon's severe shortage of wheeled vehicles and to make use of the large numbers of excess trucks in local U.S. Army depots. Westmoreland and Vien agreed to the idea, and in July MACV turned over 250 jeeps and 76 trucks to the South Vietnamese. Although at first regarding the measure as a temporary expedient, Westmoreland expanded the practice by ordering American units to turn in excess vehicles, logistics personnel to scour depots for spare trucks and parts, and maintenance shops to restore damaged machines as quickly as possible for transfer. By the end of the year American military units had loaned nearly 1,500 trucks to the South Vietnamese army, and MACV was considering transferring 935 more trucks and extending the procedure to tanks and armored personnel carriers. At this juncture, however, the practice came to a sudden halt. Westmoreland and his USARV deputy, Lt. Gen. Bruce Palmer, Jr., determined that the "temporary loan" concept was becoming a substitute for the Military Assistance Program.[44] Most of the items on loan would probably not be returned, and American stocks had become dangerously low. The proper course of action, according to Westmoreland and Palmer, was to speed up equipment deliveries and end the drain on the U.S. Army supply system.[45]

In October 1967, to systematize his various requests and proposals to modernize the South Vietnamese armed forces, Westmoreland consolidated all of them into a special five-year Military Assistance Plan, encompassing weapons, communications, and ground, water and air transportation.[46] In November he boiled down his outstanding requests into a special ten-point package—which included the new rifles, machine guns, mortars, and radios, plus 1,702 trucks, 4,183 M79 40-mm. grenade launchers, artillery, and artillery ammunition—with suggested delivery dates. In early February 1968, in the midst of the Tet offensive, he recommended accelerating delivery of all requests and added a new requirement for 234 armored personnel carriers and 27 helicopters. Later in the month he reiterated his previous requests and added another for 10,000 M72 (LAW) 66-mm. antitank rockets and, for the territorials, 268,000 M16 rifles and 11,200 M79 grenade launchers.

Washington now gave these requests immediate attention. The U.S. Air Force and Coast Guard, for example, turned in about 20,000 M16s for shipment to South Vietnam, and the Defense Department airlifted some 1,000 M60 machine guns and 25 M29 mortars to Saigon. All were earmarked for the South Vietnamese armed forces. But by then even more equipment was needed to replace that lost in the heavy fighting that was taking place, and MACV began working on a much larger modernization effort for its hitherto neglected ally. Meanwhile, the major enemy offensive in progress made it apparent that the deeper questions involving the image of Saigon's fighting forces would be decided on the battlefield and not in Washington or in the American press.[47]

Notes

[21] JCS-MACV, Combined Campaign Plan 1968, AB 143, 11 Nov 67, pp. 4–7, SEAB, CMH. Quoted words on p. 7.

[22] Notes of 12 Aug 67 (at "weekly strategy session"), History file 20–A, Westmoreland Papers, HRB, CMH.

[23] For details, see USMACV, "Command History, 1967," 2:808–16; Ltr, Westmoreland to Donald G. MacDonald, Director, USAID, Vietnam, 18 Aug 67, sub: USAID Resumption of Advisory Responsibilities to Saigon Port Authority, COMUSMACV Signature file, 1967, Westmoreland Papers. Both in HRB, CMH.

[24] Briefing, MACJ–46, 26 Oct 67, sub: Republic of Vietnam Armed Forces Logistic System, MICRO 1/ 1624, RG 334, WNRC.

[25] Ltr, Westmoreland to Vien, 9 Dec 67, COMUSMACV Signature file, 1967, Westmoreland Papers, HRB, CMH.

[26] First and second quotations from Msg, COMUSMACV to Subordinate Commands, 8 Oct 67, History file 23–A12. Third quotation from Notes of 20 Oct 67, History file 24–A. Both in Westmoreland Papers, HRB, CMH.

[34] Msg, Westmoreland MAC 8875 to McConnell, acting JCS chairman, 20 Sep 67, History file 22–A16, Westmoreland Papers, HRB, CMH.

[35] Msg, Westmoreland to Sharp, 28 Feb 68, sub: Weaponry for RVNAF, COMUSMACV Message file, Westmoreland Papers, HRB, CMH.

[36] For background, see Materiel I & M: M16 Rifle file, SEAB, CMH, especially Memo, Director, FPAO, to General Johnson, 7 Nov 66, sub: Findings of Small Arms Weapons Systems (SAWS); and Thomas L. McNaugher, *The M16 Controversies* (New York: Pragger, 1984).

[37] Msg, COMUSMACV MAC 42787 to CINCPAC, 6 Dec 65, History file 2–G2, Westmoreland Papers, HRB, CMH.

[38] In December 1966 Colt's maximum manufacturing capacity was about 25,000 rifles per month.

[39]Msg, COMUSMACV to CINCPAC, 21 Oct 67, sub: Modernization of ARVN Weapons, SEAB, CMH. See also Msg, COMUSMACV MAC 32534 to CINCPAC, 4 Oct 67, sub: M16A1 Rifle Priorities, COMUSMACV Signature file, 1967, Westmoreland Papers, HRB, CMH; Msgs, Johnson WDC 12935 to Abrams, 290324 Sep 67, and Abrams MAC 9179 to Beach (CINCUSARPAC), 301134 Sep 67, Abrams Papers, HRB, CMH.

[40] For details of early plans to modernize the South Vietnamese armed forces, see Materiel I & M file and I & M Pre-1968 file, SEAB, CMH.

[41]Msg, Abrams MAC 5307 to Johnson, 040950 Jun 67, Abrams Papers, HRB, CMH.

[42]Msg, COMUSMACV to CINCPAC, 21 Oct 67, sub: Modernization of ARVN Weapons, SEAB, CMH.

[43] USMACV, "Command History, 1967," 1:207–13, HRB, CMH.

[44] The Army component command in Vietnam supervised the transfer process.

[45] For summary, see Msgs, Palmer ARV 191 to Beach, 27 Jan 68, and Beach HWA 0384 to Palmer, 2 Feb 68, subs: Loan of Equipment to ARVN, COMUSMACV Message file; Msg, Palmer to Westmoreland, 26 Jan 68, sub: Loan of Equipment to VNAF, COMUSMACV Signature file, 1968. All in Westmoreland Papers, HRB, CMH. At the time Saigon was short 1,525 ¼-ton jeeps and 1,672 2½-ton trucks.

[46] Msg, Pearson, MACV J–3, to Deputy, SACSA, JCS, 25 Oct 67, sub: Optimum RVNAF Force Structure, History file 24–A29, Westmoreland Papers, HRB, CMH.

[47] For details, see USMACV, "Command History, 1968," 1:262–68, and documents in RVNAF materiel files, SEAB, CMH.

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The Logistics Lessons of Vietnam

Introduction. In this brief article Lt. Gen. Joseph M. Heiser, Jr., Commander of the 1st Logistical Command in Vietnam, summarizes the lessons learned in the field of logistics during the Vietnam War and discusses them in the context of the accepted principles of Army logistics. General Heiser relies heavily on the massive report of the United States Joint Logistics Review Board, entitled Logistic Support in the Vietnam Era, *as well as the "Principles of Army Logistics" outlined in Chapter 3 of AR 11–8.*

If the experience in Vietnam is to be of any lasting benefit to the United States, the above axiom must be recognized and beneficial lessons drawn from that conflict must be applied. Moreover, it is equally important that those factors which did not contribute to the success of U.S. efforts there be eliminated. Thus, one must learn as much as possible about critical subjects such as the logistic experience in Vietnam, which provided an actual proving ground for testing the defense logistic capability of this country.

Was logistic support to Vietnam a success? On the basis of hearings and General Accounting Office audits conducted from 1968 to 1970, a Congressional committee concluded that ". . . support to Vietnam was . . . a demonstration of superb performance. . . ."[1] Operational readiness rates increased to the "highest ever found in a combat zone." [2] Combat commanders such as Generals William C. Westmoreland and Creighton W. Abrams as well as the troops themselves attested that ". . . as a result of the successes achieved by our logisticians, the U.S. Forces were never restricted in combat operations by a need for essential supplies and enjoyed the highest quality of personal service ever provided to troops in combat."[3]

However, this Congressional committee also concluded that the "superb performance" was degraded by "appalling waste," indicating that the effectiveness attained was not matched by economy and efficiency. Despite this, their report stated that:

Reproduced from Joseph M. Heiser, Jr., "'First With the Most' Not Enough: Vietnam Logistics: Past Is Prologue?" *Defense Management Journal* 12, no. 3 (July 1976):74–79.

> The Army has acted aggressively and shown a willingness to reevaluate longstanding, and sometimes cherished, concepts and review them according to the dictates of efficiency. . . . The committee wishes to voice its support of the present actions being taken . . . the committee's recommendations will serve as an endorsement and as a means of emphasizing the importance of follow-through.[4]

The committee therefore recommended that the Department of Defense "assimilate the Vietnam experience in longer range logistics planning."[5]

It is therefore imperative that the effectiveness of the logistic principles applied to the Vietnam experience be assessed, recognizing the outstanding successes of that operation as well as the failures contributing to the degradation of the logistic effort.

Economy of Force

The U.S. military establishment has long recognized that "Economy of Force," a major principle of war, is the key to success in employing combat force. Yet little emphasis has been given to the "Economy of *Logistic* Force" and its proper application.

In the past the proposition "to get there first with the most"[6] has often been used out of context as a justification for logistic actions; in fact, at one time a logistical command actually used "first with the most" as its official motto. Unfortunately, this quote originated with Confederate General Nathan Forrest, who was speaking *not of logistics* but of his success in battle when he stated that he tried "to get there first with the most men."[7]

In Vietnam the U.S. did get there "first with the most," transporting far more materials and supplies to the ports than the American forces in the objective area could receive, store, or manage. The Vietnam depots contained 1.5–2 million tons of material by 1968,[8] but only some 20–30 percent of it was available for combat support, with the remainder "lost" since it was not on stock record. Thus, there was at least temporary logistic chaos at objective ports and storage locations, due only minimally to enemy interference.

However, between September 1968 and June 1969, this tonnage was reduced 75–80 percent by consumption of on-hand stock, retrograde of excess or unidentified items, and intensive command management control of incoming and retrograde shipments. (In late 1968, almost $400 million worth of supplies were cancelled before departure from the U.S., having been found to be unnecessary.[9]) It was proven that greater effectiveness could be achieved with approximately 20 percent of previously maintained tonnage.

This experience led to the adoption of an "Inventory in Motion"[10] principle which integrates all of the functions of logistic support—including supply, maintenance, improved communication, automation, transportation, and command management control—to regulate the flow of materiel into and out of the combat zone as needed. Utilizing such techniques as direct supply support and closed loop of reparables resulted in the avoidance of unmanageable depot stocks while main-

taining a high standard of combat effectiveness through practical, economical command management.

Logistic Fundamentals

Certain basic elements of logistics and their application to Vietnam operations directly affected the degree of economy and efficiency attained. Among the more significant are:

- Planning Requirements.
- Management Intelligence.
- Transportation Movement Control.
- Logistic Publications.
- Direct Logistic Support.
- Logistic Command and Control.[11]

Planning Requirements

For the national defense effort to be even minimally effective and efficient, there have to be contingency plans which contain time-phased logistic requirements. These requirements for manpower, materiel, facilities, and services must be established early so that action, as approved, can be taken "to provide a higher degree of positive follow-through"[12] than that which occurred in support of Vietnam plans.

Published as early as 1959 and revised in 1962 and 1963, these plans contained information and data sufficient to identify weaknesses and constraints that would occur in support of U.S. combat operations. However, while the requirements for all essential major items of materiel, construction, communication, and ports and other operational facilities were recognized, action "had not been taken to alleviate all the identified logistic shortfalls prior to the execution of combat operations. . . ."[13]

A major element of Vietnam planning requirements was the need for logistics personnel and support organizations trained in the operation and management of logistic commodities and weapon systems. Unfortunately, "logistical activities in South Vietnam often experienced shortages of personnel with specific skills and technical training."[14] This absence of trained logistics personnel and appropriate logistic command and control units, especially early in the Vietnam operation, contributed greatly to the lack of economy and efficiency found in logistic operations.[15]

Management Intelligence

Just as strategic and tactical decisions require credible intelligence to assure effective combat support, logistic decisions also require credible logistic management intelligence. In the early years of Vietnam, management information systems were virtually nonexistent. Nor was there an organized, trained, and staffed logistic control structure or standard, automated procedures. As a result, logistic decisions often were necessarily made without proper analysis of factual data.

Experience in World War II had proven that the U.S. Army Overseas Supply Agencies were essential to providing coordination between continental U.S. (CONUS) sources and the theaters of operation, but budgetary reductions ultimately led to their disestablishment in 1964. It was soon realized, however, that to effectively support combat forces in Vietnam, this capability would have to be reestablished. Thus, the U.S. Army Logistic Control Office was formed in San Francisco;[16] in conjunction with the Defense Automatic Address Agency, it coordinated requirements and their provision with CONUS sources, transportation, and Vietnam logistic agencies.[17] Analysis of available data using automation and communications provided the necessary logistic intelligence and led to the creation of the logistic intelligence file. Through the remainder of the war this was progressively improved by further standardizing and automating management data.

The battle commonly regarded as the turning point in the Revolutionary War was that at Saratoga in 1777, which the British lost as a result of ". . . the breakdown in Burgoyne's transportation."[18] Although to a lesser degree, transportation movement control in support of Vietnam was similarly inadequate. As the Joint Logistics Review Board noted, "Lack of an adequate movement control system was a contributing factor to the confusion in the coordination between . . . CONUS and overseas logistic support organizations; port congestion and shipping backlogs; and a lack of proper coordination within the transportation system itself."[19]

An analysis of tonnages involved in support of Vietnam (see Figure 1) is quite revealing: In Korea in 1952, the use of air logistic support reached its maximum level of 30,000 tons, by far inferior to the level achieved in the peak years of the Vietnam war. This of course indicates the short-term impact of air logistic support. But the bulk of transportation movement is necessarily done by sea. In World War II nearly 15 million tons were sealifted to Western Europe alone between June 1944 and April 1945; in 5 years of support to Vietnam, only a little more than 17 million tons were sealifted. In fact, in the 1965–1966 time frame, as many as 100 ships with half a million tons of cargo stood off the Vietnam coast with no place to unload or store their cargoes.

FIGURE 1—CONUS TO VIETNAM IN-CARGO AIRLIFT AND SEALIFT MOVEMENT
1965–69
(Short Tons)

Calendar Year	Airlift	Sealift	Total
1965	38,000	1,230,000	1,268,000
1966	117,500	2,831,500	2,949,000
1967	207,400	4,114,000	4,321,400
1968	212,800	5,046,400	5,259,200
1969	175,800	3,941,200	4,117,000
		Grand Total	17,914,600

Source: Special Assistant for Strategic Mobility Statistical Digests 1965–69 (Joint Chiefs of Staff)

Fortunately, because Vietnam was by nature a limited war, generally sufficient transportation assets were made available to meet requirements. However, substantial ineconomies and inefficiencies were the direct result of this lack of a ready, trained movement control organization.

The international aspects of transportation movement control are also worth emphasizing. U.S. forces in Europe today are almost completely dependent for transportation movement and its control upon bilateral agreements with various host nations. But one might recall that during the fall of South Vietnam, transportation movement control was made vastly more complicated by the necessity to transport large numbers of noncombatants from the combat zone. The impact of this factor on the outcome of the war should be duly considered in light of the bilateral situation in Europe today.

Logistic support as well as operation and care of materiel by the combat user was hindered in Vietnam by inadequate cataloging.[20] The logistic system was so burdened that the U.S. had an unmanageable, immobile logistic load which inherently led to gross inefficiencies. For example, during the war millions of catalog changes took place (see Figure 2). Having approximately 25,000 units or other DoD activities maintaining the appropriate catalogs proved an impossible task; as a result, most catalogs at CONUS national source levels were changed, but most at other echelons were not. The inevitable effect was an inability to properly communicate needs from one to the other.

FIGURE 2—DEPARTMENT OF DEFENSE CATALOG CHANGES

Item Management Transfers	1,442,700	(July 1965 to October 1969)
Unit Price and Unit of Issue	410,235	(Fiscal Year 1966 to March 1968)
Item Reduction	1,073,819	(1962–1969)
Logistical Reassignments	4,000,000	(1967–1969)

Source: Headquarters, Defense Supply Agency, October 1969.

Another aspect of the publications problem was that of initial cataloging for support of materiel containing engineering estimates of parts required (initial provisioning). Subsequent experience with operational materiel almost always proved that the catalog information needed significant change in terms of reducing items required. However, lack of timeliness and improper administration of essential change led to incorrect data. This resulted in a Theater Area Stockage List (TASL) in 1966–67 of between 200,000 and 250,000 lines required to support Army responsibilities. It took nearly 3 years of combat consumption before the valid TASL was reduced to a workable 50,000–60,000 lines. For example, when the Sheridan (M551) tank was introduced in Vietnam in 1968, 3,000 peculiar line items were designated by CONUS to be stocked in the combat zone for support of this vehicle. A year's combat experience indicated that 350 lines (or 10 percent) at the maximum were required. Management, even with automation, could not effectively accommodate more lines than that finally proven necessary. Until this stage

of progress was reached, only the dedicated efforts of U.S. personnel, a good high priority system, and an unsophisticated enemy allowed the effectiveness rates to be satisfactorily maintained.

Direct Logistic Support

The logistic experience in Vietnam has strongly impacted on future logistical support of combat operations. Today the increased complexity and mix of materiel, in addition to the worldwide responsibilities of the U.S. Armed Forces, require that improved transportation, communication, and other logistic functions be used to gain national logistic systems support in any theater of operation; the day of theater "self-sufficiency" is no longer practicable.

Less bound by traditional philosophy, the U.S. Air Force was the frontrunner among the Services in incorporating this doctrinal process of "logistic system support." In Vietnam, the Air Force logistic system provided effective support for forces by using the same policies and procedures in the combat theater as in CONUS and other areas of the world. The only alterations were those of emphasis or priority, the establishment of long lines of communication, and the redirection of supply pipelines.

Of necessity, the U.S. Army depended upon the Red Ball supply system to maintain operational readiness. Demonstrating the "inventory in motion" principle, shipments were made from CONUS sources directly to forward combat zones, within limits of practicality.

In Vietnam, it was discovered that accountability for the T–53 engine (for the UH–1 helicopter) was inadequate despite the fact that there was a relatively low density of the engines in the supply system and they were critically short for combat requirements. This provided a model which led to a total of over 200 item assemblies being introduced into the Closed Loop System, where modules or components could be directly exchanged.

In reality, the Red Ball and direct exchange systems gave birth to the current Direct Supply Support System of the U.S. Army. For Direct Logistic Support is the modern application of the principle of logistics, "impetus of support is from the rear!" This means providing whatever support is needed by any military unit from wherever it can be most effectively rendered in a timely fashion. Thus, the civilian expertise of the U.S. Army Materiel Command (now known as the U.S. Army Materiel Development and Readiness Command (DARCOM)) was loaned to the 2nd Logistical Command on Okinawa in order to identify and condition-code the retrograde from Vietnam, much of which was subsequently returned there. Further civilian expertise from DARCOM and its contractors contributed immeasurably to the increased operational readiness of U.S. Army aircraft in the combat zone.

Logistic Command and Control

Appropriate command and control echelons proved essential in Vietnam. In 1962, commanders initiated a requirement for an Army Logistical Command

Headquarters staffed by professional logisticians. This was not approved until April 1965, and even then a competently trained and organized command unit was not provided—the organization was activated in Vietnam and staffed with whatever personnel were available.[21]

Although the 1st Logistical Command, backed up by the 2nd Logistical Command in Okinawa and by the rest of the U.S. Army logistics system, successfully met this challenge to logistics management, this professionally capable command and control structure was achieved too late in the war.

In one of their major findings, the Joint Logistics Review Board stated:

> A component commander required to furnish major logistic support to ground forces in a contingency operation must be provided with a logistic management capability, vested in an officer whose rank and logistic experience are appropriate to the ultimate scope of the logistic operation. This senior logistician and his staff must participate in prior planning . . . and be deployed to the area concurrently with the forward echelon of the headquarters of the combat forces.[22]

The Board went on to recommend that a professional logistic personnel base be provided, emphasizing that the Logistic Deputies to the military chiefs of each Service be given:

> . . . policy responsibility for developing . . . qualitative and quantitative requirements for and capabilities to provide trained officer, warrant officer, enlisted and civilian logisticians. This responsibility to include maintaining staff cognizance over logistic officer, warrant officer, enlisted, and civilian personnel management.[23]

Integrated Logistic Support

Vietnam truly provided a combat "logistics proving ground." The challenge in overcoming the problems associated with supply, maintenance, transportation, communication, automation, and other services required logistic commanders and staffs to utilize not only *recognized* principles and techniques, but also *innovative* logistic management practices.

The challenge forced these logisticians to take an *integrated* logistic approach to attain effective combat support. Despite an inauspicious beginning and limitations of time, space, and personnel, the final result was an efficient, economical logistic support operation seldom, if ever, approached in any combat zone.

However, all the logistic problems were by no means solved. Many, including such significant facets as common logistic support, property disposal, and logistic support of allies, still need practical solutions; but the experience of Vietnam does provide valuable insights into these as well.

Ultimately, an invaluable reservoir of logistic lessons—both successes and failures—was developed and proven on the battlefields of Vietnam. These must be utilized to the fullest if the United States is to achieve maximum progress in the

pursuit of that most essential logistic principle—*Economy of Logistic Force*. Readiness in the defense of the U.S. and its national goals demands no less.

Notes

[1] U.S. Congress, House, Committee on Government Operations, *Military Supply Systems: Lessons from the Vietnam Experience*. H. R. 91–1586, 91st Cong., 2d sess., 1970.

[2] Lt. Gen. Joseph M. Heiser, Jr., *Logistics Support* (Washington: Department of the Army, 1974), p. 176.

[3] William C. Westmoreland, *A Soldier Reports* (New York: Doubleday & Co., 1976), pp. 185–88.

[4] *Military Supply Systems*.

[5] Ibid.

[6] James A. Huston, *The Sinews of War: Army Logistics 1775–1953* (Washington: Chief, Military History, U.S. Army, 1966), chap. XXXV.

[7] *Colliers Encyclopedia*, 1968 ed., vol. 10, p. 196.

[8] "Systems Overview, The Logistics Review," U.S. Army Vietnam, 1965–1969, Headquarters, U.S. Army Vietnam, vol. 1, chap. IV. Also "Report on War in Vietnam" (U), Commander-in-Chief, Pacific, June 30, 1969.

[9] "Logistic Support in the Vietnam Era," a report by the Joint Logistics Review Board, 1970, monogram 17 (*Supply Management*), chap. III., sec. F, para. 11.

[10] "System Overview," vol. 1, chap. IV, p. 37.

[11] Such important advances in logistics management as modular maintenance, containerization, and prefabrication, all of which contributed so significantly to the effort in Vietnam, cannot be specifically detailed due to space limitations. The references cited in this article, however, contain a wealth of information in these areas.

[12] "Logistic Support," monogram 12 (*Logistics Planning*), chap. VIII.

[13] Ibid.

[14] "Logistic Support," monogram 14 (*Military Personnel in Operational Logistics*), chap. IV.

[15] "Logistic Support," monogram 13 (*Maintenance*), chap. X; Heiser, chaps. II and XI; "System Overview," vol. 2 (*Command and Management*), annex A, pp. 3–4; "Logistic Support," monogram 17, chap. VIII.

[16] Logistic Support," monogram 17, app. A.

[17] Ibid., chap. III, sec. F.

[18] "Logistic Support," monogram 18, chap. IV, sec. B.

[19] Department of the Army, *Logistics Support of the Armies—Sept 1944–May 1945* (Washington: Department of the Army, 1959), chap. IV.

[20] Huston, p. 57; "Logistic Support," monogram 17, chap. III, sec. E; "System Overview," vol. 3, annex B; "A Review of Support in the Vietnam Era," a report by the Joint Logistics Review Board, 1970, vol. 2, p. 266.

[21] "Logistic Support," monogram 12, chap. III, p. 24.

[22] "A Summary Assessment with Major Findings and Recommendations," a report by the Joint Logistics Review Board, vol. 1, sec. B.

[23] "Logistic Support," monogram 17, p. 370.

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Findings of the Joint Logistics Review Board

Introduction. The Joint Logistics Review Board was established by the Deputy Secretary of Defense in 1969 to "review worldwide logistic support to U. S. combat forces during the Vietnam era so as to identify strengths and weaknesses and make appropriate recommendations for improvement." The Board's report was published in 1970 and volume 1 contains a summary of the logistical lessons learned during the Vietnam War, extracts of which are provided here. The Board's findings were instrumental in bringing about changes in logistical doctrine, organization, and procedures, which substantially improved the logistical support of our military forces in later years.

15 Major Findings of the Joint Logistics Review Board

1. Responsive Logistic Planning

"The planning system of the Department of Defense must provide for: (1) a realistic appraisal of logistic resources to achieve balance between operational concepts and logistic capabilities; (2) the establishment of credible requirements for critical logistic resources; and (3) recognition in the Planning, Programming, and Budgeting System of the impact of inadequate logistic resources on operational capabilities."

2. Early Management Capability

"A component commander required to furnish major logistic support to ground forces in a contingency operation must be provided with a logistic management capability, vested in an officer whose rank and logistic experience are appropriate to the ultimate scope of the logistic operation. This senior logistician and his staff must participate in prior planning for contingency operations and be

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Extracted from United States Joint Logistics Review Board, *Logistic Support in the Vietnam Era*, vol. 1: *A Summary Assessment with Major Findings and Recommendations* (Washington, D.C.: Office of the Assistant Secretary of Defense, Installations and Logistics, 1970).

deployed to the area concurrently with the forward echelon of the headquarters of the combat forces."

3. Force Structure

"The force structure of the active duty components of the Armed Forces must be designed to permit adequate logistic support of ready forces in quick reaction to emergency situations. During peacetime, emphasis was in some cases placed on the maintenance of combat and combat support forces without adequate combat service support units and trained technical personnel. As a consequence, when contingency operations are undertaken and the Reserves are not called up, serious deficiencies in logistic units and trained logistic personnel may be expected. There is a need, therefore, to enhance readiness to respond promptly to limited war of scope comparable to the Vietnam conflict without reliance on national mobilization or callup of Reserves to conduct logistic operations."

4. Ammunition

"Procurement and production of an ammunition item involving large volume, extensive noncommerical facilities, high costs, and multiple users should be assigned to one of the primary users of that particular munition or related group of munitions."

5. Transportation

"An adequate transportation capability, with a proper balance between sealift and airlift resources, is essential to deployment and successful support of forces deployed in an overseas area. Since the bulk of materiel must be transported by surface means, an adequate and responsive sealift must be in-being. Such a capability is dependent on a modernized MSTS [Military Sea Transportation Service, now the Military Sealift Command] nucleus fleet backed by access to the resources of an equally modern US merchant marine. A responsive and adequate airlift must be available to support initial deployments, to provide for follow-on movement of personnel, items designated for normal movement by airlift, and for high-priority materiel. The growing capability of US civilian and [military] airlift emphasizes that the Services must develop and test boldly engineered logistic systems to exploit the advantages inherent in this mode of transportation."

6. Joint Logistics Responsibilities

"Although the basic responsibility for the support and maintenance of forces must remain with the Services, unified commands must plan for and be staffed for active involvement, when required, in the multiservice aspects of transportation and movement control, construction, ammunition and POL resupply, communications, medical evacuation and hospitalization, and control of critical items."

7. Foreign Assistance

"US foreign assistance activities require coordination at the interdepartmental level during planning for and execution of military contingency operations, whether or not US combat forces are deployed. During the planning process, it is

especially important to define clearly the responsibilities for and the relationships between military and civilian activities."

8. Construction

"The planning and implementation of construction programs related to contingency operations should incorporate:

a. Service development of construction requirements;

b. Centralized in-country coordination and control of construction at the unified command level;

c. Planning, programming, and funding procedures tailored to an emergency situation;

d. The use of preengineered, prefabricated, relocatable facilities as a means of improving construction responsiveness and reducing the construction effort."

9. ADPS Support in the Combat Area

"Effective and efficient logistic support to deployed forces has become absolutely dependent on ADPS [automatic data processing systems) in supply and maintenance operations. ADPS capability for logistic management must be introduced in a combat theater as soon as possible with adequate communications support and with the capability of interfacing with ADPS outside the combat area."

10. Communications

"Logistic management has become increasingly dependent on ADP and high-speed digital data transmissions, both within the contingency area and between CONUS and overseas locations. Therefore, logistic contingency planning must be explicit as to communications requirements, and heavy transportable self-contained equipment must be developed to provide prompt availability of high-quality circuits, automatic switches, and terminal equipment to tie into the automatic digital network (AUTODIN)."

11. Common Supply

"Common supply of high-demand items used by elements of two or more Services can result in effective and economical supply support. The most profitable areas for the application of common supply support include subsistence, selected items of POL, and construction material. There is a need to develop criteria defining the commodities and conditions under which common supply support should be applied."

12. POL

"Because POL is so essential to support of military operations, the responsibilities of and interfaces between the military departments, the unified commands, and the Defense Supply Agency/Defense Fuel Supply Center must be clearly defined so as to eliminate misunderstanding."

13. Excesses

"Major origins of excesses in Southeast Asia were the inability to accurately forecast requirements during the rapid buildup, often undisciplined and repet-

itive requisitions, and overtaxed and inadequate logistic management resources. Some unavoidable excesses were created by changes in operating decisions and by obsolescence of equipment. Steps must be taken to tailor logistic operations to those that can be reasonably performed in the combat area. Programs should be established to identify excesses as early as possible during the initial phase of a conflict and should continue throughout its duration. An effective system for the rapid redistribution of identified excesses should be available as soon as practicable."

14. Containerization

"Containerization offers the Services a major opportunity for a breakthrough in simplifying and speeding logistic support to deployed forces. Therefore, the use of containers should be developed and exploited as rapidly as possible."

15. Concepts for Future Managementistic Support in the Combat Area

"Available techniques must be aggressively pursued to reduce the requirement for logistic resources in the combat area without a reduction of operational capability."

Conclusions

"History suggests that, in major logistics operations like those in Vietnam, Korea, and World War II, several management problems will always occur during the initial stages of a conflict. Among these recurring problems are the following:

(1) Transportation capability will be a critical factor.

(2) Logistic capabilities in the theater will for some time be overtaxed and control must be established to regulate the flow of men and materials in accordance with priorities established by the commander.

(3) Construction of facilities will seriously lag behind requirements.

(4) Communications will not meet all requirements.

(5) Ammunition, POL, and food—bedrock essentials that are consumed in large quantities—will require special attention.

These known problems must be anticipated before actual events compel their consideration."

Applicability of Lessons Learned

"Before concluding this summary, it is appropriate to address again the application of lessons learned in Vietnam to the many possible situations that may develop in the future. It is certain that some future emergencies will develop logistic problems that did not surface in the Vietnam era. On the other hand, each of the Board's findings and many of its recommendations are related to basic principles of logistics and management. An intensity of warfare higher than that in Vietnam will accentuate the need to adhere to these fundamentals. The details of some of

the recommendations may alter with new techniques and capabilities, but the underlying principles are enduring."

Chapter 11

The Logistics of Rapid Deployment

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Rapid Deployment in 1942

Introduction. The first major deployment of U.S. forces in World War II occurred in the early months of 1942 when Army and Navy forces were rushed to the Pacific island of Bora-Bora to establish a refueling base for Navy vessels on the critical trans-Pacific route to Australia. The operation was conceived and executed in great haste and resulted in many problems. This study by historian Charles R. Shrader examines the consequences of the lack of either time or established procedures for planning the logistical support of rapid deployment operations.

At the end of 1941, in the immediate aftermath of the Japanese attacks on Pearl Harbor and the Philippines, America's only remaining line of communication with Australia was an underdeveloped 7,800-mile route spanning the South Pacific. It was clear to all that future operations in the Pacific to defeat the Japanese would require a well-developed chain of bases across the Pacific and that immediate efforts were required despite our sketchy knowledge of the region.

Accordingly, on Christmas Day 1941, Admiral Ernest J. King, the commander in chief, US Fleet, instructed Navy planners to determine the site for a fueling base to improve the South Pacific route.[1] Five days later Admiral Harold R. Stark, the chief of naval operations, recommended that a base be established on the island of Bora-Bora which was then under Free French control. King approved the concept at once, the Army quickly agreed to participate, and planners from both services began to work out the details. By 8 January, the joint basic Army and Navy plan for the occupation and defense of Bora-Bora had been completed and signed.

The objective of the planned operation, which was given the code-name BOBCAT, was twofold: to establish a fueling station for the US Navy and to facilitate the use of shipping routes from the United States to Australia and New Zealand.[2] The plan required the Army to defend the island and its installations, to assist the Navy in the defense of ships within range, to provide for subsistence of

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the force once ashore and to assist the Navy with the necessary construction work.[3] The Navy was to transport the force to Bora-Bora and to assist the Army in defending the island. The Navy's main responsibility, however, was to be the construction and operation of a 270,000-barrel naval fuel depot, as well as necessary defense and support facilities.

The troop list for BOBCAT was relatively lean, but all the assigned units were first rate. The joint task force, including officers, totaled only about 4,300 men. The Navy element, 23 officers and 451 sailors led by Commander Carl H. Sanders, was made up of a seaplane scouting squadron, fuel depot operators, support and harbor control personnel, and Detachment 1, 1st Construction Battalion.[4] The much larger Army element included 192 officers, one warrant officer and 3,645 enlisted men. Army units included most of the 102d Infantry, two batteries of the 99th Field Artillery Battalion (Pack), Headquarters, 3d Battalion, and Batteries F and H, 13th Coast Artillery Regiment (Harbor Defense), the 695th Signal Aircraft Warning and Reporting Company, the 8th Station Hospital, and miscellaneous support elements. The largest Army contingent was the 198th Coast Artillery (Antiaircraft), a Delaware Army National Guard regiment which had been in federal service since 1940. Commanded by Colonel George J. Schulz, the 198th was considered "one of the best trained, fully equipped Antiaircraft Artillery units in the United States Army." [5] Overall command of the Bora-Bora operation was assigned to Colonel Charles D. Y. Ostrom, a coast artillery officer.[6]

Between 8 January and the proposed sailing date of 25 January, there was much to do. Army troops and equipment were scheduled to embark at Charleston, South Carolina. The Navy personnel, equipment and construction materials were to load at Quonset Point, Rhode Island, and at Norfolk, Virginia, with final redistribution and loading at Charleston.[7] Of necessity, the assembly of men and materiel, the selection and preparation of ships, and the loading at three separate ports proceeded simultaneously and, in some cases, began even *before* the joint plan was actually issued.

The Army units involved moved quickly to prepare for deployment. The experience of the 198th Coast Artillery was typical.[8] The 198th was stationed at East Hartford, Connecticut, when movement orders were received on Sunday, 11 January. By Wednesday, the 198th's advance party had left for Charleston, immunizations and personnel documents had been updated and the regiment had been equipped with the new M1 Garand rifle. Supply shortages were filled locally by transfer of equipment from other units in the same corps area or by the supply services that also made shipments direct to the port of embarkation (POE).[9] Preceded by their guns and other unit equipment, the 198th left East Hartford at 0700, 16 January, and arrived at Charleston early the next morning.

The Navy's problem was somewhat more complex. A massive amount of construction equipment and materials had to be gathered. BOBCAT probably would not have been possible except for the experience gained and the stockpiles created at Quonset Point for the building of Lend-Lease bases for Britain and Iceland.[10] A Navy construction unit also had to be formed from "scratch" especially for the Bora-Bora operation. The nucleus of the 250-man detachment was drawn from the

first headquarters construction company which had been organized in early December 1941.[11] Commanded by Lieutenant Commander Sylvester, the men of the detachment were the first of the famous "Seabees" to be deployed overseas in World War II. The Seabees and other Navy units loaded and moved to Charleston on 17 January.

The original plans were soon overwhelmed by a multitude of problems, most of which stemmed from the lack of sufficient time to prepare and conduct the embarkation. From the beginning, major difficulties were encountered in obtaining adequate shipping.[12] Six vessels were required, but the Navy could provide only three. The other three had to be obtained from the US Maritime Commission and had to be refitted and armed on short notice. One of the vessels was damaged and the US Army transport *Arthur Middleton* was substituted. The *Middleton* was newly built but had to be armed and altered by the Navy to provide more troop space. Before leaving New York, her master reported to Third Naval District headquarters that she was unstable and required 1,500 tons of ballast to compensate for her new armament. The Navy declined to act, and the *Middleton* thus sailed to Charleston with a 12-degree list.[13] At the Charleston navy yard the BOBCAT Seabees received their first mission, to correct the *Middleton*'s list by installing concrete ballast. The Seabees had to be used because the shipwrights at the yard already had their hands full with repairs to the expedition's other troopship, the very old *President Tyler*, which had been used for seven years as a freighter.

The inadequate World War I–vintage facilities at the Charleston Army POE added to the challenge.[14] There was only limited storage space, railroad trackage alongside the warehouses was limited, and there was space for only three ships at a time alongside the wharf. Motor transport at the port was extremely scarce, and the stevedore labor at Charleston was clearly inadequate to work so many ships around the clock. The stevedores were also singularly slow and inefficient and the soldiers and sailors of the BOBCAT task force had to perform much of the final loading themselves.[15] Even the food in the port's mess hall was so bad that the troops of the 198th nearly rioted.[16]

At Charleston, the problems intensified as loading began. The importance of correct loading was clearly understood by everyone.[17] However, an orderly loading according to the approved, coordinated plans proved impossible. For one thing, the assembly of the material at the loading points, especially at the naval supply depot at Charleston, was hurried and confused. In addition, both Army and Navy cargo was so poorly marked that it defied identification. Even the crack 198th Coast Artillery contributed to the confusion and delay when its equipment arrived uncrated despite specific instructions to the contrary issued by the planners. In sending out the movement orders, Headquarters, I Corps, had left out the clause pertaining to this requirement which caused a last-minute scramble to find labor and packing materials.[18]

Further difficulties arose when the allotted ships became available in a sequence unsuited to the loading plans. In order to make the appointed sailing date, each ship had to be loaded with whatever cargo was available at the time the ship arrived. In addition, some Navy cargo, as well as the eight 7-inch coastal guns

and their ammunition, had to be loaded at the navy yard rather than the Army POE. Ostrom explained that:

> ". . . the PRESIDENT TYLER was found actually to have no boom heavy enough to lift the 7-inch guns and carriages which it had been planned to place on her . . . Cargo removed from the TYLER was then reloaded elsewhere. Naturally the carefully planned load of the ship receiving the cargo previously on the TYLER became somewhat disarranged. . . ."[19]

A similar situation existed with respect to the *Middleton*. Time did not permit a complete job of reballasting the ship, thus heavy cargo planned for other ships had to be stowed in the *Middleton*'s lower holds instead.

The worst was yet to come. The straw that almost broke the camel's back was 800 tons of Navy cargo which arrived unexpectedly.[20] It consisted of barge pontoons, bulldozers, vehicles and other bulky cargo that should have been distributed among all the vessels to ensure quick access at Bora-Bora. Many of these items were "heavy lifts," and the three bulldozers alone required 18 hours to load. Moreover, instructions had been issued to load all ships to capacity. Thus, when the loading was nearly complete and it was seen that space was available for another few hundred tons, Ostrom and Sanders were forced to determine, on the spot, what extra items were needed and what could be obtained on short notice.[21] They established priorities and additional rations, cement, machinery, equipment and reinforcing steel were loaded, all out of sequence and, of course, not in accordance with the original loading plans.

In spite of the problems and delays, Convoy *Baker Cast 100*, consisting of two troop transports, four cargo vessels, one tanker and an escort composed of the cruiser *Richmond* and six destroyers, finally got underway for Panama in the mid-afternoon of Tuesday, 27 January, two days behind schedule but only 32 days from the date the operation had been first conceived. [22] The BOBCAT convoy reached Panama on the morning of 2 February. At Panama, additional supplies, including a supply of blank forms provided by the adjutant general of the Panama department, were loaded, and the detailed unloading plans that had been made en route from Charleston were reviewed and coordinated.[23] Once through the Panama Canal and into the Pacific Ocean, the convoy met its new escort of two old light cruisers, the *Trenton* and the *Concord*, and two destroyers from Rear Admiral John F. Shafroth's Southeast Pacific Force. After an uneventful voyage, the convoy arrived off Bora-Bora around noon on 17 February 1942, 48 days after the decision to send it had been made.

The island atoll of Bora-Bora is in the Leeward group of the French-owned Society Islands, 140 miles northwest of Tahiti. [24] The island lies 2,700 miles south of Hawaii, 5,200 miles southwest of Panama and 3,000 miles northeast of Australia. The site of the film *Tabu* and other South Seas epics, Bora-Bora is of volcanic origin and is dominated by the 1,030-foot Matatuhua Peak. It is a small island, about 4.5 miles long and 2 miles wide, with a steep barrier reef one to two miles offshore. The natural passage through the reef is curved and thus protects the

two usable harbors: Teavanui Harbor and the smaller Fanuii Bay. The island has over 20 miles of coastline (not including the *motus*), long, narrow areas of dry land with sparse vegetation interspersed with the barrier coral reef. From the high peaks and ridges in the center of the island, the land slopes to the water, often precipitously. There are few flat areas.

The climate of Bora-Bora is typical of the South Pacific. The temperature ranges from 69 to 92 degrees Fahrenheit year round. Bora-Bora is perpetually humid and, although there is usually some slight air movement, the highest wind recorded by BOBCAT observers was a gust of 40 knots. Rainfall is normally high and the BOBCAT landings were made in the rainy season of an unusually wet year.

Bora-Bora has three main settlements: Viatape, Fanuii and Anau. The principal village is Viatape on Teavanui Bay. In 1942, the population of the island was about 4,000. In addition to the native Polynesians, the population consisted of a few Chinese merchants, several Free French officials, and an American couple, Mr. and Mrs. Frank Hedges, who owned a house near Viatape and who had been stranded there when the war began.[25]

Like the other islands of the Pacific, Bora-Bora was virtually *terra incognita* to Army and Navy planners in 1942. [26] The BOBCAT force was preceded by a naval survey ship that provided some hydrographic data, but plans for the land installations were based on a map drawn by French navigators nearly 100 years before. The only other source of information available to the planners in Washington was a naval aviator who had been to the island in 1936. After the convoy sailed, the Army staff accidentally discovered a young Army Reserve officer who, as a graduate student, had visited Bora-Bora in the summer of 1941 to do research for his thesis on Japanese colonization.[27] Second Lieutenant Walter H. Pleiss, Ordnance Corps, was flown to Balboa and joined the convoy as it passed through the Panama Canal. He was scarcely qualified to advise on the technical difficulties that lay ahead, and the information he did have on the island was not very useful.

The baleful effects of insufficient planning and preparation time became immediately apparent at Bora-Bora. The hasty loading at Charleston proved the truth of Shafroth's observation that "a most serious handicap is imposed upon any military expedition starting overseas if that expedition is improperly loaded."[28] As unloading began, it was soon discovered that some cargo needed immediately, such as the tools needed for establishing campsites, tentage and mess equipment, was deep in the holds. Conversely, some of the top-loaded equipment was not needed right away and had to be stacked helter-skelter along two miles of beach. The problem was further complicated by the poor marking of the cargo, which made specific items almost impossible to find except by breaking open the crates.[29]

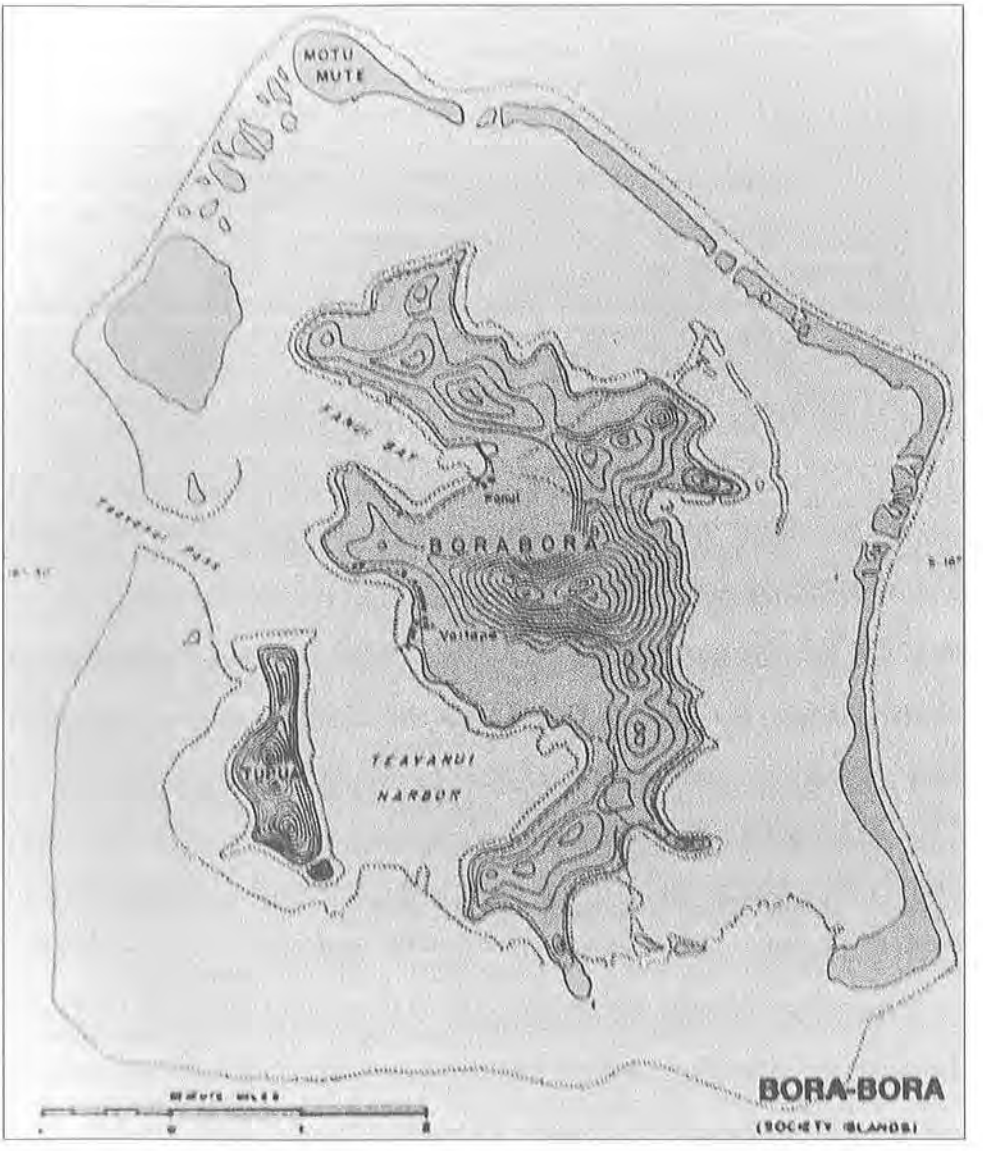
It was also soon discovered that none of the ships had sufficient slings, cargo nets and the other gear for discharging the cargo, although some equipment had been obtained at the last minute from working stocks at Charleston.[30] The combat ships of the escort were of no help; they had "stripped ship" of both cargo gear and boats in Panama. Thus, ships loaded by dock cranes in Charleston had to be discharged "in the stream" with only the most basic gear.

Problems were especially acute with regard to the lighterage needed to unload the ships. Here was a classic Catch-22 situation. As Shafroth pointed out, "The ships could not be unloaded without the floating equipment and the floating equipment could not be assembled without unloading."[31] In the confusion at Charleston, some of the bolts and other parts for the four 50-ton self-propelled pontoon barges were misplaced, and valuable time was lost at Bora-Bora in finding them. Even so the four barges were assembled and put in service in the first eight days after reaching Bora-Bora. However, three weeks passed before the first mobile crane was located and unloaded, and at the end of the third week, the three 100-ton barges still had not been uncovered. Four 30-ton tank lighters stowed on deck saved the day. They were operational within 24 hours, but had to operate at reduced speed because of engine trouble. A few 40-foot and 60-foot motor launches were also available; but even after the available lighterage was put into operation, it proved insufficient to keep up a steady flow from ship to shore.[32]

The unloading was made more difficult by the lack of suitable landing places.[33] The only immediately usable landing was at Viatape where there was a long wooden pier built on cribs made from coconut logs and filled with rock, coral and earth. However, the pier was in relatively shallow water and had only 50 feet of usable face. A truck could barely turn around at the end of the pier which was only 12 feet wide. There was also one small landing suitable for the tank lighters available at Viatape. The other landing area, at Fanuii, had a wood deck pier 20 feet long and 6 feet wide, with 5 feet of water located at the end of a long, narrow causeway unsuitable for use by a loaded truck. The Fanuii site was essentially useless until it could be improved. Eventually, causeways and a marginal pier were built at Fanuii and the other landing sites were much improved, but the effort took time and manpower away from the primary mission.

Storage space ashore was also a real problem. The largest firm, level area on the island was at Viatape but it measured only 250 feet by 400 feet.[34] Initially, supplies were piled wherever dry footing could be obtained. Huge stacks of cargo covered all available space at the landings. A local cinema was leased for sorting flour and sugar, and a schoolhouse was used for the most perishable PX supplies, but there was no other covered storage. [35] Little dunnage was available, and tents were used in lieu of tarps but provided little protection from the heavy rains which could drop over one inch of rain in 20 minutes.[36] At one landing place, thousands of bright green cans of Altes beer ("the green beer in the green can") burst from their rain-soaked cases and lay littered about the beach.[37]

One defect of the BOBCAT troop list, common to most military operations, was that an insufficient proportion of service troops were assigned to the operation. [38] Native labor was also scarce, and the inhabitants of Bora-Bora had no particular interest in earning money since there was little on which to spend it. Sixty men were eventually induced to help when Ostrom authorized sales of about $200 worth of commissary items to the natives each month.[39] The lack of service troops and local labor meant that many Army and Navy personnel had to abandon their primary duties to help unload the ships.



Despite the best efforts of Sanders, who was responsible for the discharge and movement of cargo to the shore, and Lieutenant Colonel Berrien, who was responsible for unloading at the shore, distribution and storage, the unloading proceeded very slowly. Even working all the ships at the same time, 24 hours a day at six landings, 52 days were required to discharge the BOBCAT convoy and one additional supply ship.[40] The delay made the vessels sitting ducks for a Japanese attack, but more important it tied up ships needed for other missions.

The difficulties did not abate once the force was ashore. Movement around the island was restricted to a single-lane road of 22.5 miles which circled the island.[41] This path, only half of which was even marginally usable, had numerous small bridges and culverts that the Army's heavy trucks quickly broke down. Road work was required immediately, but the Seabees' request for road building equipment had been denied and the Army had made no allowance for construction equipment. In fact, the Army units had left most of their vehicles behind and, although the unexpected addition of 100 bicycles was welcome, it did little to repair the shortage of proper road-building equipment.[42] The work had to be done with only one small rock crusher and Army cargo trucks, the six Navy dump trucks being unable to negotiate existing trails. Rocks were broken by hand and fed into the crusher. The crushed rock was shoveled into the trucks and then spread by hand. In point of fact, there was not a lot of rock to crush or spread. There was no quarry and little loose rock on the small atoll. Coconut trees were the primary building material for all uses. The use of crushed coral proved unsatisfactory because the "live" coral road surface became extremely slick when wet—and it was perpetually wet. The road frequently washed out and all the hand labor went for naught. Despite great efforts, the island rudimentary road net remained little improved until late in 1943 by which time it was largely unneeded.

Perhaps the most difficult problem was ensuring an adequate supply of fresh water. The existing water supply of the island immediately proved inadequate for the 4,400-man expedition's needs. Bora-Bora's water system consisted of a single 1-inch water pipeline from Viatape to Fanuii with faucets at intervals on concrete posts.[43] Strict water discipline had to be enforced because the Navy distillation units could not meet the added demand, nor was the rain water (collected in galvanized tubs, chemically treated and distributed from Lister bags) adequate to make up the deficiency.[44] On 7 March, Lieutenant Colonel Duncan of the 198th was given the mission of solving the problem of water supply. Over a period of six weeks, a complete water supply system was built by erecting four dams on the main streams and constructing a distribution system of approximately 13 miles of 4-inch pipe originally intended for construction of the fuel oil tank farm.[45]

Essential defense and support facilities had to be built before work could start on the tank farm. By 26 April, much had been done.[46] The antiaircraft defenses, including an air warning system, were very near completion, and work had progressed on the coastal defense gun positions. The eight 7-inch guns salvaged from the old pre–World War I battleship *Connecticut* were brought ashore on 10 March.[47] Work on the first of the four two-gun defense batteries was very slow; the subsequent three were installed somewhat more rapidly. In every case, the guns had to be mounted on skids and hauled by hand 1,000 to 2,000 feet up 45-degree slopes.[48] Eight magazines, four battery command posts and the harbor defense command post had also been completed. New landings had also been developed and 20 messes, a sales commissary and a PX were in operation. By 18 September, when Ostrom again reported on progress, the accomplishment was more impressive.[49] Housing for 4,350 men and a 250-bed hospital had been completed. The construction of warehouses and storage facilities for fuel oil, gasoline and ammu-

nition were 60 to 80 percent completed. Five miles of roads, six electric power plants, a sewage system and the water system had also been completed.

The problems of unloading, building accessory service facilities, and inadequate manpower and equipment delayed the start of the tank farm construction until 2 April. There, too, the planners had erred by assuming that the tanks could be installed on a "coastal flat." The so-called "coastal flats" nowhere extended more than 50 to 150 yards in from the coast before rising abruptly.[50] Thus, the 27 10,000-barrel fuel tanks, each of which was 56 feet in diameter, 25 feet high and had 38,000 bolts, had to be installed on shelves blasted from solid rock.[51] More than 720 Army personnel worked with the 250 Seabees seven days a week in three shifts for a total of 18,000 working hours to complete the first eight tanks by 9 June, so that the first tanker to arrive could be discharged promptly. But, at a rate of about three days per tank, the tank farm was not completed until March 1943.[52]

The base at Bora-Bora faced a threat of Japanese invasion until after the Battle of Midway on 6 June 1942. Thereafter, the threat was remote and as the war in the Pacific proceeded, the base at Bora-Bora gradually declined in importance with only one or two ships per week stopping to refuel.[53] The Bora-Bora complex was never attacked, was never expanded into a major base and played only a minor role in subsequent Pacific campaigns. The 198th Coast Artillery, its proficiency reduced by boredom and inactivity, was transferred to Efate in the New Hebrides in February 1943.[54] The Seabees moved to Samoa in September 1943 to support the 22d Marines.[55] The base was placed on reduced status on 1 April 1944 and was disestablished on 2 June 1946.

As the first American experience in rapid deployment and support in World War II, Operation BOBCAT was "a step into the unknown"[56] which clearly demonstrated that both accurate information about the target area and a good deal of time were needed to make a strategic concept a logistic reality. The operation also indicated that inexperience, coupled with the lack of systematized internal procedures within the services and lack of an established system of coordination between them made the defects of time and information even more profound. That BOBCAT was ultimately successful in the face of so many complex problems can only be explained by Ostrom's comment that "the Army units were superb; they accomplished almost superhuman tasks. The same may be said of the naval personnel; there was most generous cooperation."[57] Without such cooperation, Operation BOBCAT might have been a dismal failure.

Despite the insignificant role that the Bora-Bora installation actually played in the war, the experience gained in Operation BOBCAT proved immensely valuable as American forces fought their way across the Pacific to the Japanese home islands. From the difficulties of BOBCAT and similar operations were derived systematic methods of joint planning and coordination that permitted planning and execution to proceed quickly and efficiently despite inadequate time or insufficient information about the objective. The sophisticated and highly effective logistic planning techniques which were used for later major logistic operations such as the build-up on Guam, the Normandy invasion, and Operation Olympic (the planned

invasion of Japan), thus had their origin in the earlier Bora-Bora bungling and Operation BOBCAT.[58]

Notes

[1] The conception and planning of Operation BOBCAT are discussed by Duncan S. Ballantine, *U.S. Naval Logistics in the Second World War* (Princeton, NJ: Princeton University Press, 1947), 67; *Building the Navy's Bases in World War II: History of the Bureau of Yards and Docks and the Civil Engineer Corps, 1940–1946*, vol. 2, (Washington, 1947), 191; and Richard M. Leighton and Robert W. Coakley, *Global Logistics and Strategy, 1940–1943* (Washington, DC: Office of the Chief of Military History, 1955), 179.

[2] *Bora Bora Operations*, draft by William C. Frierson, Historical Division, War Department Special Staff, Washington, 1943. 1. The typescript is preserved in the US Army Center of Military History Historical Manuscripts Collection as MS 2–3.7 AA.

[3] BG Charles D.Y. Ostrom. Comments on the draft of *Bora Bora Operations* (attached to the typescript cited in note 2), 1–1.

[4] Ervan F. Kushner, *Bogged Down in Bora-Bora* (Paterson, 1984), 194.

[5] Ibid., iv.

[6] Ostrom, first (unnumbered) page.

[7] Leighton and Coakley, 180.

[8] Kushner, 12–15. The preparations of the 198th Coast Artillery Regiment (Antiaircraft) are described in detail.

[9] *Bora Bora Operations*, 3; Leighton and Coakley, 179–80.

[10] Ballantine, 67; *Building the Navy's Bases*, vol. 1, 117.

[11] *Building the Navy's Bases*, vol. 1, 133 and 147.

[12] The difficulties in finding and preparing the ships for the operation are described by Ballantine 68; Leighton and Coakley, 180; and Ostrom, 4–2.

[13] Kushner, 18.

[14] Ostrom, 4–1.

[15] Kushner, 16.

[16] Ibid., 15.

[17] Ballantine, 68. Details of the problems at the Charleston POE are given by Ostrom, 4–1; Leighton and Coakley, 181.

[18] Leighton and Coakley, 181.

[19] Ostrom, 4–1 and 4–2.

[20] Leighton and Coakley, 182.

[21] Ostrom, 4–2.

[22] Ibid., 4–3.

[23] Ibid., 4–4.

[24] For a physical description of the island and its population, see *Building the Navy's Bases*, 196; Kushner, *passim*. Meteorological conditions are described by Ostrom, 9–3.

[25] Kushner, 23.

[26] Leighton and Coakley, 183.

[27] Ray S. Cline, *Washington Command Post: The Operations Division* (Washington, 1951), 81–82; Leighton and Coakley, 183.

[28] Letter of Rear Admiral John F. Shafroth to commander in chief US Fleet, 21 March 1942, reproduced in *Bora Bora Operations*, 5.

[29] Leighton and Coakley, 183.

[30] Ostrom, 4a–8 and 4a–9.

[31] The problem of discharging and rigging the lighterage is described in detail by Admiral Shafroth in his 21 March letter to Admiral Ernest J. King, reproduced in *Bora Bora Operations*, 6.

[32] Leighton and Coakley, 183.

[33] The various landings are described by Ostrom, 4a–1; Kushner, 28, provides additional details.

[34] Kushner, 39.

[35] Ostrom, 4a–8.

[36] Kushner, 39–40.

[37] Ibid., 39.
[38] Leighton and Coakley, 185.
[39] *Bora Bora Operations*, 18.
[40] Ibid., 10.
[41] The road-building problems are described by Ostrom, 4a–9; *Bora Bora Operations*, 8; *Building the Navy's Bases*, 198; and Leighton and Coakley, 184.
[42] Ostrom, 2–A.
[43] Kushner, 37.
[44] Ostrom, 9–2; Ballantine, 69; Kushner, 37.
[45] *Building the Navy's Bases*, 199.
[46] BG Ostrom's 26 April 1942 report to Army Chief of Staff General George C. Marshall is cited in *Bora Bora Operations*, 10–11.
[47] Kushner, 39.
[48] *Building the Navy's Bases*, 199.
[49] BG Ostrom's 18 September 1942 report to GEN Marshall is cited in *Bora Bora Operations*, 18.
[50] *Bora Bora Operations*, 8.
[51] Ballantine, 70; *Building the Navy's Bases*, 200; Leighton and Coakley, 184.
[52] *Building the Navy's Bases*, 200 and 202.
[53] Ibid., 201.
[54] Kushner, 173.
[55] *Building the Navy's Bases*, 202.
[56] Leighton and Coakley, 185.
[57] Ostrom, first (unnumbered) page.
[58] Ballantine, 71.

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Rapid Deployment Logistics—Lebanon, 1958

Introduction. These excerpts from Lt. Col. Gary H. Wade's study of the logistical support of the U.S. intervention in Lebanon in 1958 sketch the logistical doctrine in effect at the time and its effectiveness under actual employment. In addition Wade describes the planning process as well as airhead and port operations. He concludes with a summary evaluation of the logistical support of Operation BLUEBAT, *among the first of our modern rapid deployment operations.*

The Operation

The countries of the Middle East experienced intermittent crises during the 1950s. Lebanon was no exception, as internal turmoil and outside pressures threatened its existence. This research survey, however, will not dwell on the political situation of either the entire Middle East or, specifically, Lebanon in the spring of 1958. Suffice it to say, President Camille Chamoun of Lebanon made an urgent plea on 14 July 1958 to the governments of France, Great Britain, and the United States to deploy military forces to Lebanon to stabilize the situation. Received in Washington at 0600 on 14 July, this message became the first test of the Eisenhower Doctrine, which had been announced in January 1957.

Through the Middle East Resolution, or Eisenhower Doctrine, Congress authorized the United States to provide economic and military assistance to requesting nations to preserve their Independence. The Eisenhower Doctrine stated that the independence and integrity of these Middle East nations were vital to world peace and to the national interest of the United States. If these nations were "attacked from a country under the control of international communism then the President was authorized, upon request, to send forces to resist that attack."

Reproduced with the permission of the Combat Studies Institute from Gary H. Wade, *Rapid Deployment Logistics: Lebanon, 1958*, Combat Studies Institute Research Survey no. 3 (Fort Leavenworth, Kans.: U.S. Army Command and General Staff College, October 1984), pp. ix–xi, 15–17, 35–41, and 79–82. The notes have been

U.S. military analysts believed that Lebanon was threatened internally by strong and numerous rebel bands, "most of which were strengthened by Egyptian and Syrian infiltrators constituting a fifth column," and externally by the armed forces of Syria "poised in strength" along the border. Given this situation, the United States intervened. President Dwight D. Eisenhower wanted "to move into the Middle East, and specifically into Lebanon, to stop the trend toward chaos." Ten hours after the receipt of President Chamoun's message, the Chief of Naval Operations ordered the U.S. Sixth Fleet (Mediterranean) eastward to land Marines in Lebanon. On 14 July, the Joint Chiefs of Staff (JCS) alerted U.S. forces in Europe and the Tactical Air Command in the United States to ready for immediate military action. The JCS also activated a Specified Command, Middle East (SPECOMME), and designated Adm. James L. Holloway, Commander in Chief, North Atlantic and Mediterranean, as the Commander in Chief, SPECOMME (CINCSPECOMME). According to a JCS memorandum, "These actions marked the beginning of operation 'Blue Bat,' the first United States airborne-amphibious operation to occur in peacetime."

By 16 July, over 3,000 Marines had landed. The U.S. Army forces making up Army Task Force 201 (ATF 201) consisted of the 187th Battle Group from the 24th Infantry Division. This force began arriving in Beirut on the nineteenth, and, by the twenty-fifth, over 3,000 personnel and approximately 2,500 short tons of equipment had been brought in aboard 242 air missions. Shortly thereafter, the sealift in support of the Army brought in an additional 3,650 soldiers and 45,450 measurement tons of supplies in three transports and thirteen cargo vessels.

The U.S. forces landed unopposed and quickly found themselves in a role limited to showing force instead of using it. With the 31 July election of General Fuad Shehab, commander of the Lebanese army, as the new president and his subsequent inauguration on 23 September, a semblance of order returned, and U.S. forces began their departure. During the three months of American involvement, one U.S. battle death occurred, while U.S. armed forces caused no civilian casualties. The American projection of power had worked, as the political situation had at least become stabilized temporarily.

This absence of combat did not radically alter the logistical support for the force, which still had to be fed, clothed, housed, and cared for. Of course, ammunition resupply, casualty evacuation, and combat loss replacement were not important parts of the effort, but other functions, such as civil affairs, construction, and health and comfort activities, came to the fore.

Because the United States has in the past deployed military force without using it in combat (and may do so again), it is instructive to study the logistical effort behind the intervention, that is, the deployment and sustainment of this force. This research survey is concerned with the lowest level of this effort, called in some sources battlefield supply or tactical logistics. This study examines how the Army organized in 1958 to move and to support itself in the field and what process it used to do so. This research survey discusses aspects of combat service support, including such functions as resupply, transportation, procurement, civil affairs, and medical support. *Rapid Deployment Logistics: Lebanon, 1958* presents

a model for planning, deploying, and sustaining a task force—a model that offers many lessons for today's Army. The absence of combat focused more attention on these aspects than would have been the case in combat operations, and the participants had the time to document their problems and recommendations. Thus, a study of this operation will be of particular benefit for the planner, logistician, and combat arms officer. This study reconstructs the logistical doctrine for a rapid deployment contingency force as it existed in 1958 and evaluates its implementation in the Lebanese crisis.

Although the Army's logistical doctrine was generally sound, rapid deployment logistical planning for contingency force operations, such as the U.S. intervention in Lebanon, was weak. Before World War II, contingency planning had focused on technical questions and tended to ignore organizational issues. Therefore, the basis of "how to accomplish tasks" or doctrine had developed in a haphazard fashion. This doctrinal development must be examined to understand the status of contingency force operations in 1958.

* * *

Problems

Logistical planning for EP 201 was the responsibility of small groups of people. As in other cases, plans and annexes were classified top secret, with a strict need-to know policy enforced at all times. Excessive security restrictions nullified much of the good work already accomplished in the plans and caused the biggest breakdown in planning for the operation. The logistical portion of EP 201 called for the creation of a type A logistical command to serve as headquarters for the technical and service units selected for ATF 201. These units had already been carefully selected before the mission. But because of the controlled access to EP 201, few of the concerned units knew that they would be deployed. Although these units were technically proficient, they had no idea what they were expected to do, where they were to go, and how many troops they were to support. They had no knowledge of the planners' accomplishments, such as what automatic requisitions the planners had arranged and on what basis they had calculated supply units. Lt. Col. (later Col.) Dan K. Dukes, Jr., chief of plans at Headquarters, USAREUR COMMZ, who later became the deputy commander for the 201st Logistical Command, stated he did not participate in the planning and, in fact, received no briefing or any information concerning the plan. He doubted that many other officers in COMMZ headquarters were informed until shortly before the OPLAN was implemented.

Moreover, planners followed the contemporary doctrine and formed a logistical command as a focal point for all technical and service functions. They established a push system of supplies via automatic requisitions. But the planners never passed this information on to the technical units that would probably support the operational plans. USAREUR planners prepared requisitions for stocks and repair parts, but the high security classification of the plan precluded units

from identifying or earmarking stocks for fear of compromising the mission. Colonel Meetze commented:

> The pitfalls in this planning evolved into two segments, with both hampered by the high security involved: First, the selection of units required for the mission, and second, determining the items and quantities of materiel desired and when they should be available. These two segments, of course, include such details as what is a day of supply of the various types of ammunition required for the specific mission involved; how is resupply to be handled (including automatic); what theatre and organizations are to be the backup for supplies and for how long; will it be possible to procure subsistence items in the Operational Theatre, and so on and on. Remember too that coordination was required in the many echelons of command: JCS, CINCSPECOMME, USAREUR COMMZ, etc.
>
> Secrecy prevented us from obtaining valued information from staff specialists and from units which were included in the plan, and determining the quantities of all items required was a tremendous chore. The combat commanders made the decision of how much ammo and how much food each man would have with him at the time of the initial drop or landing but from then on it was the responsibility of the Support Command. Here is where the cooperation and frequent visits between the combat forces and the logistical command planners really paid dividends. Again, because of the high security of the plan, stocks could not be earmarked or segregated in warehouses or depots. It was only logical then that when the preprogrammed stocks were outloaded from depots to debarkation points on a rush basis that conditions were ripe for a "snafu."

Logistical policies set forth in EP 201 included the provision that no supplies or equipment were to be stockpiled prior to the implementation of the plan. This proved to be a major stumbling block in the coming load-out; moreover, no one, except a small cell of select planners, knew what was supposed to happen, and, of course, no one knew when it would happen.

Airhead

The first priority of the logistical command was air terminal operations. The unloading of airborne units was no problem. The ATF commander, General Gray, described the airborne's airlanding:

> As each aircraft turned into the taxiway still rolling at considerable speed, a soldier jumped off and sprinted forward to establish an assembly point for his plane load. The other soldiers came tumbling out behind him while the plane was still rolling, neatly stacked their weapons and

equipment in a line designated by the guide, then raced back to the plane to unload the A–7 containers and weapons bags. In a matter of several minutes the plane was proceeding to the runway for takeoff.

The unloading of supplies and heavy equipment was not as smooth, however. Evidently, considerable confusion existed about who was in charge of unloading. All the services used the Beirut International Airport as their air terminal. In addition, the international airport would eventually serve, on a continuing basis, as the main base of operations for helicopter, light plane, aeromedical evacuation, and antisubmarine warfare operations. All these military activities were superimposed on the constant, heavy commercial use of the airfield. The initial contacts between U.S. and Lebanese officials to coordinate air traffic consisted of little more than a Lebanese army officer and a U.S. Marine representative working with civilians to control landings and takeoffs. During the initial Army airlift, the Air Force provided a CALSU of the 6th Aerial Port Squadron. This unit attempted to control and coordinate all U.S. activities until the arrival of an aeromedical evacuation detachment. Then, the CALSU established a passenger and cargo operations area in the terminal. While these personnel made a commendable effort to carry this extra workload and did manage to operate a limited military base operations center, their numbers and technical ratings were not adequate to handle all airport and terminal activities.

Confusing instructions exacerbated the problem. CINCSPECOMME OPLAN 215–58 stated that Commander, U.S. Air Forces, SPECOMME, would establish and operate air transport facilities to improve the handling of personnel and cargo and to arrange for use of the commercial air transport terminal. A military regulation (AR 59–106/OPNAV Instruction 4660.1/AFR 76–7/MARCUR JSAR 2–56–3000, 21 September 1956) delineated the functional responsibilities of the military services in connection with handling and moving traffic through Air Force air terminals, including those at advanced landing fields and airheads. Responsibilities differed somewhat for the air movement of units and the air movement of other traffic, such as cargo, mail, passengers, and baggage.

For air movement of units, the respective service (Marine, Navy, Air Force, or Army) being moved was responsible for loading, tying down, and unloading its supplies and equipment into or out of aircraft. Air Force personnel, however, provided technical assistance and safety inspections. In contrast, cargo to be airdropped was tied down and dropped by the Air Force. For movement of traffic other than units, the Air Force was responsible for accepting properly authorized and packaged traffic at the departure air terminals. Acceptance included inspecting, receiving, and unloading traffic from consigner vehicles. The Air Force also had the responsibility of loading, tying down, providing en route service and supervision, unloading, notifying consignees, and delivering traffic at the destination airfield. Delivery at the destination air terminal included loading traffic on the consignee's vehicles. The Air Force unloading capability at the Beirut airport was insufficient to support an operation of BLUEBAT's size; therefore, the command pressed combat troops into service as cargo handlers.

The cargo handling organization consisted of an Air Force team of seven to ten men for each shift; the team unloaded aircraft with two forklift trucks and roller conveyers. The Air Force, however, did not have enough personnel to do the job. The 201st Logistical Command provided a team headed by a transportation officer who supervised the unloading of passengers and cargo. Army combat troops, one officer and twenty men, augmented each of the Air Force shifts. Under combat conditions, it is doubtful whether these combat troops could have been spared for that purpose. The movement priority did not infiltrate support troops soon enough to prevent congestion and confusion.

Maritime Operation

As with the airlift, the sealift began almost on time. Because only a single airhead was available and to assure adequate supplies for the task force, the Army loaded two vessels with planned emergency resupply at Leghorn and Brindisi, Italy. On 19 and 20 July, the ships sailed to Beirut, opening the first phase of the sea operation.

On 20 July, Delta and Echo forces moved to the ports of Bremerhaven, La Pallice, and Saint-Nazaire. In general, rail and highway movements to the ports were effected with minimum disruption of normal traffic flow. At these ports, the men and materiel were promptly loaded, and the first vessel sailed for Beirut on 24 July. This sea tail eventually consisted of 4,862 passengers and 72,011 measurement tons of cargo.

Before departing for Beirut, Colonel Meetze had sent his S3, Major Kaufmann, to Bremerhaven to supervise the loading of the main elements of Delta and Echo forces on the USS *General Randall*, the USNS *Upshur*, and USNS *Geiger*. According to Colonel Meetze, Major Kaufmann had no experience in port operations and was content to let the civilian workers handle the operation. Unloading problems resulted in Beirut because the longshoremen did not "combat load" the ships; instead, they loaded the ships "civilian style," even the new roll-on and roll-off vessel, the USNS *Comet*.

Longshoremen at Bremerhaven loaded the *Comet* with 10,711 measurement tons, "a remarkable lift considering the 'balloon' nature of much of the cargo" (tanks and trucks). Participants estimated that the *Comet* held the same amount of cargo as four or five World War II Victory ships. The lack of loading ramps and the narrow pier aprons at Bremerhaven, however, prevented roll-on loading, but crane loading took no longer than for conventional vessels. Once aboard, the vehicles were driven to their parking areas. Additional crane-loaded cargo, however, blocked the passageways of the *Comet*, causing problems at the receiving end because "vehicles had to be lifted out of the vessel before other vehicles could be rolled off."

Two officers and seven enlisted men, the initial Army staff of transportation personnel in Beirut who organized port operations, encountered difficulties while unloading. As described by a staff officer, "failure of operators and staff officers involved in port operations to have knowledge of the overall plans restricted their

capabilities to cope with certain facets of the operations." Furthermore, local stevedoring services were not immediately available because of unsettled labor conditions, the language barrier, and certain Lebanese bureaucratic features. Accordingly, initial unloading operations went slowly and would probably not have met the requirements of a combat situation.

Cargo manifests compounded the problem of too few people to carry out the mission. Many manifests were incomplete or missing altogether, and stevedores literally had to unload a ship to discover what was aboard it. For example, no one identified the 299th Engineer Battalion's D–7 bulldozers until 15 August because the shipping manifest listed them as D–8 dozers assigned to the 79th Engineer Construction Battalion.

Conflicting instructions given at home stations for preparing trucks for sea movement caused more problems. Longshoremen removed considerable materiel from truck beds at the port of embarkation to permit efficient storage in the ship holds. They stored the removed materiel without any regard for unit or requirement. On arrival, stevedores unloaded and transported this materiel to assorted dumps where others identified it and shipped it to the proper unit. A dump located at the 299th Engineer Battalion contained communications equipment, ammunition, hospital beds, tents, a fluoroscope, and dump truck headboards. Units had to send labor details to the beach and staging areas to pick up much-needed supplies. Once there, however, the details faced long hours of waiting without any assurance that any of their equipment would be unloaded.

The 229th Engineer Battalion explained the implications of incorrect cargo manifests:

> The identification of this unit's TAT ("to accompany troops" equipment) was extremely difficult on debarkation from the [USNS] Upshur. A correction to the personnel manifest erroneously awarded a portion of this unit shipment number 74,000 DTX in addition to its correct shipment number 74,000 DMX. Consequently, half of this unit's TAT was marked DMX and the other half DTX. Shipment number 74,000 DTX was shared with the 79th Engineer Construction Battalion which was also aboard the USNS Upshur. As a result, much time was spent opening all shipping boxes marked DTX to determine the rightful owner, and considerable effort was required in double handling much of this equipment. The TAT was loaded in a haphazard manner aboard the ship and was not identifiable by unit on the ship's cargo manifest.

Once again, faulty execution negated contingency planning.

Result

Problems like incomplete instructions, faulty manifests, and scarce labor could have seriously jeopardized the success of the mission. Unlike the Marine battalion landing teams that arrived ashore with thirty days' combat supplies, Army troops carried a minimum level of supplies. Furthermore, the planned resup-

ply by air was also minimal, as the Army chose to rely on surface resupply. Accordingly, planners should have provided for adequate military personnel to unload MSTS and commercial ships early in the buildup phase. This provision would have allowed Army forces to operate independently of indigenous labor. Personnel for port operations might have been phased into the theater in increments commensurate in size to the off-loading requirements and local labor. In special cases, qualified personnel, such as winch operators, might have accompanied the initial deployment to be readily available as needed at the port. Finally, planners should have defined the responsibilities of units more clearly.

Nevertheless, under ATF 201, Americans did deploy to the operational area. In the broad sense, the plan worked. General Gray explained later: "No basic change had to be made in our plan, and such adjustments as were required fell entirely within its framework. On the other hand, we were not loaded and locked within the time frame we had projected and, therefore, did not achieve our objective. In sum, the plan succeeded; we failed in its execution." The plans, however, lacked the details necessary for a smooth deployment, such as the confusion non-divisional units had over load-out procedures, incomplete manifests, and cargo loading at the port in Bremerhaven. Other failures in execution resulted because of the high security classification of plans. This was the most significant drawback to well-integrated execution.

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Summary

General Adams's forces accomplished the overall mission in Lebanon. They followed existing contingency plans, and the U.S. Army demonstrated its ability to deploy rapidly. The operation also served as a practical test of an emerging logistical doctrine of tailoring support forces to a specific ground force mission. Furthermore, the planning process provided valuable lessons for future operations.

The tailoring of logistical forces worked, but not without drawbacks. The designated support units must have a working knowledge of the plans so that they can devise complementary plans. Support units, like combat units, must train together to ensure teamwork. Higher headquarters must integrate the nonorganic combat service support units into the planning process and ensure that those units have an opportunity to rehearse the aspects of plans that affect their operations.

Another critical aspect of the planning process is worst-case planning. Worst-case planning means forecasting the worst situations that a deployed force may encounter. Worst-case planning, in conjunction with a logistical doctrine of pushing supplies forward, might have led to the problems encountered in Lebanon during 1958 and to similar problems in the Dominican Republic during 1965. The after-action reports of the Dominican Republic operation read as if they applied to Lebanon. These reports stated that the automatic resupply procedures were not sufficiently flexible to cope with changing requirements. One of these after-action reports, Operation Debrief, declared that "all interviewees stated that to some

degree the automatic resupply was wasteful, inadequate, uneconomical, and generally mixed up." Moreover, the procedures to change automatic resupply were inadequate or nonexistent. Similar conclusions were reached for the earlier Lebanon operation. Although the automatic resupply or push system (the buildup of supplies according to levels for X number of days) met requirements, it was labor intensive and did not readily adapt to changing situations. It also required secure, spacious areas for storage, particularly if units did not consume the supplies immediately. This system created waste and piles of unused supplies.

As mentioned earlier, these factors were caused by worst-case planning in conjunction with this particular logistical doctrine. In Lebanon, the lack of fighting (a best-case situation) freed manpower to handle massive resupply shipments. In this situation, worst-case planning did not balance the need for combat power against a labor-intensive logistical effort. If worst-case planning had come to fruition and heavy fighting had ensued, then the logistical effort would have been severely taxed. A dilemma develops in planning for heavy combat between the size of the fighting forces and that of follow-on support. Only by engaging in limited or no fighting would the manpower be freed to manage the logistical system. A solution is to combine the push-pull systems. Furthermore, such a system comes closest to the goal of just-in-time logistics.

The logistical doctrine used by the U.S. Army during the 1983 operation in Grenada was a combined push-pull system. Logistical personnel had prepackaged supplies designed for a Grenada-type contingency operation. The units that deployed to Grenada also preconfigured resupply packages. Generally, these supplies were sent to the operational area on request by the deployed unit, but an automatic system was also used for certain resupply (mainly ammunition) items. In this case, the system was flexible enough to change the packages based on actual requirements. In some instances, supply personnel on Grenada made requests for special items, which normally would have taken at least a day; yet, a few minutes after their request, a plane would land carrying the needed items. The logistical personnel had already anticipated that request, and these instances indicated the close working relationship between the deployed force and the logistical personnel. It may be years before full disclosure of the Grenada operation can be made, but, based on the Lebanese and Dominican Republic experiences, the combined push-pull system appears to be the best of both worlds.

The operational lessons of the Lebanese operation are as old as military art itself and are just as critical now as at any time in the past. The detailed execution of plans, such as the proper implementation of loading plans, and the meticulous marking of cargo manifests are crucial. Practice exercises and rehearsals are needed to ensure this capability. Unrealistic loading plans will disrupt the best-made plans for a strategic movement. Inattention to detail adds confusion in the objective area and belies efficient planning.

Planning for the deployment of the airborne battle group was, in the sense of mission accomplishment, effective. But there were significant omissions in joint and theater planning, particularly for the resupply of potable water and medical support and for civil affairs.

In planning for water resupply, well-digging teams were assigned to the force. Finding a potable water supply in Lebanon, even within a secure area and with local cooperation, proved difficult. In a hostile environment, it could have proved catastrophic. Even such solutions as providing off-shore water tankers or saltwater converters would have been vulnerable in a hostile environment.

The cooperation, coordination, and planning for medical support were inadequate. More must be done for future operations, for this is a fairly simple joint planning task. After the Lebanese operation, the Army again streamlined medical resupply and confirmed a need to keep medical resupply in medical channels.

Civil affairs and procurement activities were other areas in which planning failed. The plans did not provide adequate guidance to the commander, and, therefore, these activities were only accomplished through support provided by the U.S. embassy and the time available because of the nonhostile situation. Any future planning must seriously consider the civil-military arena.

Finally, at the unit level, the commander and staff officers involved in a deployment will inevitably encounter varying degrees of confusion and poor coordination. Once the unit is en route to the objective area, the commander will feel relieved, but many nagging questions will remain. Overclassification and rigid planning compartmentalization breed confusion. Therefore, the planner must balance security requirements with the units' need to know. Improperly disseminated plans not only promote confusion, but also occasion slovenly appearance and poor performance. The most important planning lesson from the Lebanese experience is that planners must use a classification commensurate with security requirements and not create a smug in-the-know elite. If security restrictions prevent units from learning their assigned roles in a mission, it is self-defeating.

Prior planning and rehearsal of the support function are equally important to the success of a mission. In the case of Lebanon, Grandios, the deployment rehearsal plan for the combat units, proved to be the U.S. forces' salvation. Equal consideration must be given to logistical units. Rehearsal also implies training, and training logistical units as a team must be accomplished.

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Logistical Support for the Intervention in the Dominican Republic, 1965

Introduction. Army historian Lawrence A. Yates describes the planning and execution of the deployment of U.S. forces to the Dominican Republic in 1965, with particular attention to the logistical aspects of the operation: marshaling of men, supplies, and transport; movement to the objective area; and subsequent support of the force.

In late April 1965, President Lyndon B. Johnson ordered US servicemen into the Dominican Republic in America's first armed intervention in a Latin American country in three decades. Within two weeks, the number of US Army, Navy, Air Force and Marine Corps personnel in and around the Dominican Republic reached a peak of nearly 24,000. The object of this joint (and later combined) peacetime contingency/peacekeeping operation (or "stability operation" in the parlance of the time) was to restore order to a country in the throes of civil war, to protect the lives of American and other foreign nationals, to provide the military muscle that would enable US and Latin American diplomats to negotiate a political solution to the crisis, and to prevent Dominican Communists, some Cuban-trained, from seizing power. By these criteria, the intervention was highly successful.

It was also highly controversial. In a dress rehearsal for the public debate over Vietnam, critics of the intervention accused the president of assigning to himself the role of "world policeman." Usually supportive newsmen complained that, by deliberately issuing false information, the administration had opened a "credibility gap" between itself and the American people, and the Pentagon expressed displeasure at the restrictions civilian policy makers imposed upon US troops in the Dominican Republic.

Behind the scenes, other issues triggered by the crisis led to equally intense, if little publicized, debates within official circles. Particularly troublesome to the

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military was its seeming inability to mount a joint contingency operation in a timely and effective way. From the outset, planning and executing the US intervention had been plagued by problems of command, control, communications, coordination and intelligence. These problems were not unique to the Dominican crisis; similar difficulties have bedeviled joint contingency operations throughout American history, up to and including those in Grenada, the Persian Gulf and Honduras. The recurring nature of these problems and, more important, the failure of policy makers and professional soldiers to recognize them as recurrent offer at least two compelling reasons to analyze joint operations in the Dominican case study.

The complex origins of the Dominican crisis can merely be summarized here.[1] On Saturday, 24 April 1965, a group of Dominican military officers, supported by sympathetic political leaders, attempted a coup against the government of Donald Reid Cabral, whose austerity programs, attempts to reform the military and tenuous legal claim to power had alienated key segments of the population. A combination of idealism and self-interest motivated the rebels, or "Constitutionalists." Their proclaimed goal was to restore the constitutional government of Juan Bosch, whose presidency had been overthrown by conservative officers in September 1963. Even though US officials had no desire to see Bosch, whom they considered an incompetent leftwing intellectual, reinstated, they could not save Reid, who resigned Sunday morning. When the rebels promptly established a provisional government in anticipation of Bosch's return from exile, diplomatic and military personnel in the US Embassy in Santo Domingo "reluctantly" approved plans by "Loyalist" troops to take military action against rebel strongpoints in the capital.[2] The attacks, carried out Sunday afternoon, transformed a coup d'état into a bloody civil war.

Even before this escalation in the fighting, the United States had made its first military move in the crisis. After receiving a request from the State Department Sunday morning, the Joint Chiefs of Staff (JCS) directed the commander in chief, US Atlantic Command (CINCLANT), to send naval vessels toward the troubled country in case embassy officials called for the evacuation of American and other foreign nationals. Task Group (TG) 44.9, composed of six naval vessels and the 6th Marine Expeditionary Unit (MEU) of about 1,700 men organized around a battalion landing team (BLT), drew the assignment. TG 44.9 arrived off the Dominican coast Monday morning only to discover that, because of inadequate equipment, it could not communicate with the embassy except by helicopter or by going through a ham radio operator working out of his home in Santo Domingo. This inconvenience notwithstanding, on Tuesday unarmed elements of the BLT, with the consent of the warring Dominican factions, began evacuating US citizens. Except for an incident in which departing Americans assembled at a hotel were harassed briefly by rebel youths, the evacuation went without a hitch. It was one of the few US military actions during the first week of the crisis that did.[3]

Although protecting American lives received a high priority from US policy makers, their principal worry was that communist elements would seize control of the revolt, and consequently, the Dominican Republic. Of the several options

US officials considered for preventing a "second Cuba" in the hemisphere, the one deemed least satisfactory was intervention by US troops. Still, as a precaution, the JCS placed two battalion combat teams (BCTs) from the 82d Airborne Division, together with the necessary airlift and tactical air support, on alert. Preparations for possible deployment entailed marshaling the troops, assembling the required airlift, rigging equipment and formulating a mission. The routine procedures covering each of these tasks did not anticipate all the difficulties that would quickly arise.

Planning began once the designated commands and units received the alert notification on Monday, 26 April. Because the Dominican Republic fell within the Navy's area of responsibility, the Atlantic Command (LANTCOM) was required to provide guidance to Army and Air Force elements that, once prepared for deployment by the US Strike Command (STRICOM), would be placed under CINCLANT's operational command.[4] Guidance took the form of an operations plan (OPLAN) covering the spectrum of possible US military action. In early 1965, LANTCOM had published an updated plan for the Dominican Republic, OPLAN 310/2–65, the provisions of which covered such contingencies as a show of force, blockade, the protection and evacuation of American nationals, and all-out intervention. In the event of the last contingency, the plan called for the deployment of up to six airborne infantry battalions and four US Marine BLTs, together with Special Forces and supporting units. The Joint Chiefs referred to OPLAN 310/2–65 when they issued their alert on the 26th, but they did not formally order its execution. In accordance with a warning included in the plan, units on alert were to regard it only as basic guidance from which they could expect inevitable deviations.

Since the 82d Airborne Division and its parent headquarters, the XVIII Airborne Corps, had not received copies of the newly published document, the staff at Fort Bragg, North Carolina, was not familiar with the "basic guidance" contained therein. More important, ignorance of the new plan denied staff officers an incentive to review their own derivative contingency plans for the Dominican Republic. When the crisis erupted, those plans were found to be woefully out of date. The corps' OPLAN 310/2L did not have up-to-date troop lists, while the division's OPLAN 310/2L–63 called for deploying two or three *battle groups*, not battalions, thus reflecting a table of organization and equipment (TOE) the 82d had discarded in its transition from a pentomic division to the new Reorganization Objective Army Divisions (ROAD) configuration. On the Air Force side, where the Tactical Air Command (TAC) would provide airlift for the 82d, the Nineteenth Air Force, TAC's planning agency, had not published the airlift portion of its component plan, while TAC's own working plan, like the 82d's, was geared to transporting two or three pentomic battle groups. Finally, none of the OPLANs, including LANTCOM's, foresaw deployment of an entire division.[5]

Staff officers at Fort Bragg and Pope Air Force Base (AFB) worked together frantically to update their plans in order to meet the deadlines imposed by procedures for readying two BCTs for combat duty under CINCLANT. Of the obstacles the staffs confronted, the most frustrating were those caused by BLUE CHIP V, a

joint Army–Air Force exercise taking place that week on post under STRICOM's auspices. The exercise tied up divisional staffs, paratroopers of the 2d Brigade and other units, available airlift, rigging lines, equipment, air field control units, parking space and billeting facilities. The two BCTs of the 82d's 3d Brigade, the designated assault echelon if an execute order came, encountered delays in getting their equipment rigged for airdrop—first, because BLUE CHIP loads had to be derigged in order to free rigging lines for the BCT loads, and later, on Tuesday the 27th, because CINCSTRIKE's refusal to cancel a parachute assault demonstration resulted in the simultaneous rigging of BLUE CHIP and BCT loads.

The preoccupation with BLUE CHIP V, when combined with reports from Santo Domingo of an imminent Loyalist victory over the rebels, diluted the urgency with which commanders and planners at Fort Bragg and Pope AFB viewed the foreign crisis. There was, the 82d acknowledged afterward, a "decreased unity of effort and singleness of purpose so necessary for rapid response." Indeed, many officers, including General Robert York, seriously doubted that Washington would order the Army into action. Not anticipating a combat deployment, York felt few qualms about sending his overworked staff home on Wednesday evening, 28 April. It would be a brief respite. Later that evening, the JCS ordered the 3d Brigade to defense readiness condition (DEFCON) 2, and the president sent 500 Marines into the Dominican Republic after the once promising Loyalist military situation took a dramatic turn for the worse.

The shift to DEFCON 2 (requiring all designated airlift to assemble at Pope AFB and the loading of equipment to begin as paratroopers staged nearby) encountered difficulties, as the unloading and repositioning of BLUE CHIP aircraft delayed the loading of rigged BCT equipment. Once it began, the loading took 14 hours, the consequence of poor lighting at Pope, too few loadmasters and inspectors, and a shortage of handling equipment. Hence, the 3d Brigade did not attain DEFCON 2 until Thursday afternoon, just hours before the two BCTs received orders to deploy. As a TAC report conceded, "The long delay in reaching the advanced condition of readiness was excessive for this type of airlift operation."[6]

The probability that the 3d Brigade of the 82d would actually deploy was not the only disquieting news staff officers received Wednesday night. The JCS also ordered four more airborne battalions, their command elements, TAC airlift and tactical air units, and the required support groups listed under OPLAN 310/2–65 placed on DEFCON 3. These new requirements transformed what had been a difficult staff activity into an almost impossible one. Locating additional aircraft, scheduling their timely arrival at Pope, devising a parking plan for an already overcrowded facility, computing systematic loading plans and finding enough men qualified to expedite them, locating billeting for the hundreds of flight crews and other personnel who would soon arrive at the airfield, and working out flight plans for a follow-on force were but the more onerous tasks that recalled weary planners to their posts. The men in three of the four newly alerted BCTs, assigned to the 2d Brigade, were also weary. Although highly trained and motivated, they had gone without sleep, some for 72 hours, because of their participation in BLUE CHIP V. Despite the indefatigable efforts of all concerned, many of the problems inherent

in the escalation to a larger intervention force would not be solved expeditiously, even after a major BLUE CHIP demonstration was canceled Wednesday evening because of inclement weather.[7]

As soldiers and airmen labored to prepare combat units and aircraft for possible intervention, York had to determine what his mission would be in the event of deployment. For this, he required timely, accurate and adequate intelligence, especially on the identity, status and location of friendly and unfriendly forces, and the location of key facilities in Santo Domingo. The information received at Fort Bragg fell far short of these requirements, causing York and his staff to argue later that "a critical intelligence vacuum existed during the vital early stages of the operation." The JCS alert message contained no guidance, and LANTCOM operations plans, whether old or new, provided little information or analysis—be it political or military, strategic or tactical—that would be of value to Army forces upon their arrival in the Dominican Republic. In the absence of secure communications with LANTCOM headquarters in Norfolk, Virginia, the 82d could get little current information from CINCLANT (who was having his own difficulties divining JCS intentions) until Thursday, 29 April, when an Army liaison officer sent to Norfolk two days earlier found a way to ensure that intelligence available to CINCLANT reached Bragg on a regular basis. Until this conduit was opened, the 82d had received only 10 intelligence messages from Norfolk, all outdated.

Some embassy and CIA reports reached the 82d, but these tended to be alternately overoptimistic or alarmist, generally unreliable, and, because of their preoccupation with the communist issue, virtually irrelevant in terms of military planning. Consequently, the two daily briefings York and other key officers in the division received were based primarily on rough translations of Spanish language television and radio transmissions, and newspaper reports emanating from Santo Domingo and monitored in the corps' emergency operations center. That many military intelligence analysts who spoke Spanish had been sent to Vietnam did not help matters. Under the circumstances, the division did not receive consistently accurate and relevant intelligence until its units had entered the Dominican Republic and began collecting their own.

Despite the dearth of reliable intelligence during the planning phase of the intervention, Army and Air Force staff officers working through the night of 26–27 April "deduced" a proposal whereby the two BCTs then on alert would airdrop near San Isidro airfield outside Santo Domingo, secure that air base, expand the airhead westward to the Duarte bridge, and stand ready to assist in the evacuation of American nationals. Contact with a military attaché in the US Embassy in Santo Domingo confirmed that a flat field next to San Isidro would make an ideal drop zone. (As it turned out, the field, which from the attaché's car appeared grassy and flat, was covered with coral rock. Fortunately, orders to airdrop were changed to airland at the last minute.) York and the commander of the Nineteenth Air Force, Brigadier General Robert Delashaw, approved the plan, but York put off disseminating it "pending clarification of the mission and receipt of a directive from higher headquarters." The battalion commanders affected by the alert did not learn of the proposed mission until shortly before deployment. As for the noncommis-

sioned officers and enlisted men of the 3d Brigade, confined to their barracks after the initial alert, they talked of "kicking Red asses," but really had no idea of what lay ahead. Information regarding specific missions was too highly classified to be passed to them. In the event of an execute order, the men were supposed to be briefed during a scheduled stopover at Ramey AFB, Puerto Rico.[8]

The launch order came Thursday afternoon, the 29th, after President Johnson decided to send ashore the remaining Marines in the 6th MEU and to deploy the 82d's 3d Brigade. In the case of the 82d, several factors—the unavailability of aircraft, a shortage of loadmasters and handling equipment, poor lighting, and the lingering feeling that an execute order was not imminent (many in the 3d Brigade were planning to attend a LAW-firing demonstration) combined to prolong the loading of equipment and men from an expected rate of 10 to 15 aircraft per hour to eight per hour, thus delaying departure.

Once airborne, General York's air armada of 144 C–130s headed for Ramey.[9] En route, York received word of several decisions that had just been made in Washington. Although the bulk of the US military effort would take place on terra firma, OPLAN 310/2–65 made no provision for the appointment of a land forces commander under CINCLANT. General Earl Wheeler, chairman of the JCS, personally corrected the oversight by naming York the interim commander of forces ashore in the Dominican Republic. York also learned that, in light of the deteriorating situation in Santo Domingo, the 3d Brigade was to bypass Ramey (and the anticipated briefings) and proceed directly to San Isidro. The assault force was to airland there, even though the troops and equipment were rigged for airdrop and even though Washington only *assumed* that San Isidro was in friendly (that is, Loyalist) hands. Realizing that the C–130s had no equipment for unloading heavy materiel rigged for parachute drop, York strongly recommended to his superiors that only the 33 planes carrying troops airland and that the equipment be dropped as planned. Permission was denied. Apparently, the president's advisers feared that parachutes opening in the night skies over Santo Domingo would appear too "warlike"—more indicative of an invasion than an intervention.[10]

Fortune was with York. When the 3d Brigade landed at 0215 Friday, 30 April, it encountered no rebel resistance. (Sixty-five of the C–130s carrying equipment were diverted to Ramey to avoid overcrowding the limited facilities at San Isidro.) There followed several hours of excruciatingly hard work as paratroopers derigged and unloaded heavy equipment by hand or with only rudimentary tools (for example, the use of axes to cut through tough nylon lines). Some of the platforms were damaged, all the men exhausted. Nevertheless, by dawn, the two BCTs, together with Troop A of the 1st Squadron, 17th Cavalry, were ready to begin operations, which for that day meant securing the east bank of the Ozama River and, after crossing the Duarte bridge, establishing a bridgehead on the west bank. Meanwhile, Marines on the western side of Santo Domingo would begin clearing a neutral international security zone (ISZ).

York coordinated these operations with his immediate superior, Vice Admiral Kleber Masterson, commander of Joint Task Force (JTF) 122, and with the American ambassador, W. Tapley Bennett. All three shared the belief that, once the

Marines and paratroopers had secured positions bordering rebel-held territory, Washington would likely order military action to defeat the Constitutionalists. With this prospect in mind, York immediately requested deployment of the four additional BCTs on alert at Bragg. Although US officials did help arrange a cease-fire later that afternoon, the agreement was so fragile that York let his request stand. It was his understanding that the president had already approved sending the additional troops.

The deputy chief of staff for operations (DCSOPS), Lieutenant General Bruce Palmer Jr., was given to believe the same thing. Slated to take command of the XVIII Airborne Corps that summer, he suddenly found the date had been moved forward on Friday when General Wheeler, acting on presidential authority, told him to go to Bragg immediately, pick up an austere corps headquarters, and fly to Santo Domingo, where he would become the permanent commander of US troops ashore. (York, the interim land force commander, would remain in command of the 82d.) Palmer was to take all necessary measures to prevent a communist victory and was promised sufficient forces to do the job. The president, in hopes that the mere *psychological* impact of a large-scale commitment of US troops might end the fighting in the Dominican Republic, had indicated that he was willing to deploy the remainder of the 82d and, if necessary, the 101st Airborne Division to "take and hold" the country. On a related issue, Wheeler confided that "communications from the scene of operations coming via the USS *Boxer* and CINCLANT were slow, sketchy, and unreliable," and that Palmer should send by backchannel to Wheeler all reports submitted up the normal chain of command, that is, through the JTF commander to CINCLANT.[11]

Neither the current corps commander at Bragg nor York at San Isidro was informed of Palmer's mission or pending arrival, and neither was particularly happy about this intrusion onto his turf, although both yielded gracefully to the inevitable. After a stopover at Bragg, Palmer arrived in the Dominican Republic shortly after midnight Saturday. In a noisy hangar, York told him about the poor prospects for the cease-fire agreement and, to Palmer's dismay, about the gap that separated US paratroopers at the Duarte bridgehead from US Marines in the ISZ. The gap hindered communications between US forces and prevented them from surrounding the rebels in southeastern Santo Domingo. Palmer exclaimed that the gap had to be closed, cease-fire or no. A reconnaissance patrol later that day showed that a link-up was feasible. What was needed were the troops York had requested and Palmer had been told to expect. To his surprise, Palmer learned that the president would not allow further troop commitments until he had reconsidered the issue. The only US combat troops to arrive at San Isidro Saturday were a "contaminated" portion of the 2d Battalion, 505th Infantry (Airborne), that had made an unscheduled departure from Pope late Friday and had failed to receive a JCS order to return.[12]

Also landing at San Isidro Saturday morning was the lead element of the 15th Field Hospital, a unit the JCS had inserted into the airlift after receiving embassy reports of massive casualties in Santo Domingo. Palmer and York were furious. The 82d and Marines already had adequate medical support. From the perspective of the

two generals, the purpose of the airlift, once the initial assault forces had landed, was to provide the ground commanders what they needed, when they needed it. And what they needed Saturday were more combat troops. "A force commander committed to an objective area must be able to request units whose capabilities augment those which are already committed," Palmer later reported, "and he needs to know what sort of units are alerted or en route to join his force."[13] (Palmer, obviously, was operating under the dubious assumption that higher headquarters had some inkling as to the alert or deployment status of the units in question.)

At the White House on Saturday morning, President Johnson approved sending additional troops into the Dominican Republic, including more BLTs under the 4th Marine Expeditionary Brigade (MEB), the remaining combat battalions of the 82d, and other critical units.[14] The military buildup to 24,000 troops was underway. Most troops came by plane in an airlift mounted in support of an operation four times larger than that anticipated under the outdated Navy, Army and Air Force plans. TAC managed to assemble the necessary aircraft from airfields around the United States, and by 7 May, these planes had accounted for 1,600 accident-free sorties, in which the crews flew to San Isidro, recycling back to Pope to pick up further loads, and returned to San Isidro. It was a grueling schedule aggravated by bad weather, few navigational aids and confusion concerning required formations. Adverse conditions notwithstanding, the crews delivered 16,500 troops and 16,000 tons of equipment and supplies in the objective area before operations began to wind down.[15]

Air Force and Army commanders praised the airlift in general, but bickered over specific shortcomings. Hasty planning and haphazard loading procedures often resulted in soldiers scrambling for available seats. Some aircraft arrived at San Isidro without full loads, while others carried vehicles that had not been crammed with rations, water and ammunition. More critical, the JCS, Palmer and York all emphasized that combat troops should be deployed with "minimum essential equipment." Despite these instructions, loadmasters did not delete heavy equipment "prepackaged" to accompany each *Power Pack* echelon. York understood that readjusting force packages was a "herculean task," but he allowed no sympathy for anyone who refused to make adjustments simply because they were not "according to plan." The general had, for example, all the 2 1/2-ton trucks he needed, yet continued to get more. "It appears," he later wrote, "that in some respects the Army is still fighting World War II. The back-up required to fight an *SS* division in Europe is not a good guide to use when determining the support required to fight irregular forces in stability operations." The 82d did not need every item on its TOE. "We must," he concluded, "in conjunction with the Air Force, develop procedures permitting great flexibility and quick response to changing tactical and support requirements." In perhaps the most telling comment of all, York intimated that, had the situation been "more volatile," the inflexibility of a packaging system that denied priority to troops and ammunition could have left the 82d highly vulnerable during the first phase of the intervention.[16]

Palmer, too, complained about the Air Force's slavish devotion to preplanned "packaging" procedures. Not only did he experience delays in getting sufficient

combat troops, but he could not always arrange priority seating for the intelligence analysts, Civil Affairs and signal personnel, and military police (MP) he needed. (The shortage of MPs during the first few days of the intervention had tragic consequences for one group of rebels who surrendered to US troops. Lacking sufficient MPs to guard the "detainees," US troops turned them over to a Loyalist unit, which promptly shot them.)

Once the airlift got underway, Palmer and York implored the JCS to authorize a continuous, around-the-clock "airstream" of recycling transports. The current practice of loading all aircraft in a given echelon before allowing any of the planes to take off from Pope, both generals argued, was causing fatigue among troops who had to wait long periods aboard the C–130s. The practice also meant that aircraft arrived within minutes of each other at San Isidro, overtaxing that field's limited landing and unloading facilities. The JCS, at first reluctant to depart from established procedures, finally authorized the airstream after being subjected to vigorous remonstrations from the 82d.

York also criticized the number of headquarters interfering with the airlift by issuing oral and written messages, many of which contradicted one another or were ambiguous and confusing. His recommended solution was to establish direct communications between the ground commander and the Department of Defense or Department of the Army, and to prohibit all intermediate headquarters from interpreting guidance between Washington and the field.[17]

If the Army commanders were not always happy with the Air Force's performance, airmen managed to level a few broadsides of their own. Air Force staffs complained that last-minute changes to mission requirements did not allow enough time in which to alter plans and disseminate new procedural instructions. The decision to send in all nine combat battalions of the 82d and supporting elements strained airlift and airfield capabilities. One Air Force study criticized Army units for aggravating the overcrowded situation at Pope by delivering massive amounts of equipment, often incompletely configured and out of proper load sequence, to the runway aprons.[18]

The airlift was only one of Palmer's major concerns during the first weeks of the crisis. Soon after arriving in the Dominican Republic, he became painfully aware of the need to streamline the military chain of command from Washington to Santo Domingo and to improve the communications available to him.[19] Although Palmer entered the country on 1 May as the de facto land force commander, his formal elevation to commander, US Forces, Dominican Republic (USCOM-DOMREP) did not occur until one week later. This delay in upgrading his status from a task force commander in charge of all US Army and Marine elements ashore to that of the commander of Joint Headquarters, US Forces, Dominican Republic (USFORDOMREP), stemmed from the inadequate communications he had at his disposal. He had brought with him only a small portion of the XVIII Airborne Corps' signal elements, and the 82d's communications equipment at San Isidro did little to enhance these meager capabilities. Both corps and division communications were geared to tactical operations involving relatively short distances. But Palmer's role was to be essentially that of a theater comman-

der, which meant that he needed a *strategic* communications capability that would enable him to contact policy makers far from Dominican shores. His safety/ security officer element did establish secure communications with Fort Bragg, enabling him to send his first backchannel to Wheeler, and by midafternoon on the 1st, he could talk directly with Masterson on the *Boxer*, even though the admiral's flag ship could only operate on one of several radio nets and had to lower its antenna—and thus cease communications—during flight operations off its deck. (On 3 May, Masterson transferred his flag to the *Newport News*, which had excellent communication facilities for joint operations.) Also, once Palmer discovered that the Air Force's "talking bird" had landed at San Isidro (a fact unknown to the corps' signal officer), the general used the plane's sophisticated communications gear to talk with the president and other Washington officials.

But these communications were still woefully inadequate and, more important, inconvenient, being located at San Isidro, across town from Palmer's command post next door to the US Embassy. The ambassador readily shared the embassy's facilities with the general, but this arrangement, too, left much to be desired. The only reliable communication between the embassy and Masterson was still by helicopter and ham radio. Cable traffic with Washington was secure, but telephone calls from the embassy were being monitored by rebels who controlled the telephone exchange. Palmer tried to solve this problem by requesting the loan of one of STRICOM's two Joint Communications Support Elements, which were tailor-made for the sort of independent and secure strategic capability he needed. But CINCSTRIKE, General Paul Adams, refused without comment, although Palmer later concluded that Adams, who had been virtually bypassed by CINCLANT during the early phases of the crisis, had adopted a "dog-in-the-manger" attitude, withholding from Palmer (and, indirectly from CINCLANT) a communications element that STRICOM could easily have lent out.

The Defense Communication Agency rescued Palmer from the dismal situation he faced. It provided long-range communications that enabled him on 3 May to move the remainder of his headquarters from San Isidro to his command post and, on 4 May, to communicate with CINCLANT without having to use the JTF commander as a go-between. On that day, Palmer became commander, US Land Forces, Dominican Republic (LAND FORCES ASHORE), with Masterson still controlling the forces assigned to the intervention with the exception of the Army and Marine units under Palmer's command. A debate ensued as to whether Palmer or Masterson would control Air Force TF 121. Palmer prevailed. On 7 May, the day he formally became the commander of what was in essence a subunified command under LANTCOM, he exercised operational control over all Army forces, the 4th MEB, and all Air Force and Navy elements in-country. TF 121 and the Navy's TF 124 retained a separate identity under CINCLANT but were placed in support of Palmer's joint headquarters. Under these arrangements, JTF 122 became a redundant command and was disestablished.

By mid-May, the military situation in the Dominican Republic had begun to stabilize and, with the establishment of an Inter-American Peacekeeping Force (IAPF), US Marines began to pull out. Political negotiations began in earnest,

leading to a provisional government in the fall of 1965 and presidential elections in 1966. Until the elections, in which Joaquin Balaguer defeated Bosch, one brigade of the 82d remained in Santo Domingo as part of the IAPF.

In terms of accomplishing its missions, the joint contingency/peacekeeping operation launched by the United States in the Dominican Republic was a success. Democracy was restored, US citizens protected and a possible communist takeover of the country prevented. But despite this success, the military—from the Pentagon, through commanders in the field, to enlisted men manning barricades in the streets of Santo Domingo—recognized that the process of preparing and mounting the operation had not gone smoothly in such critical areas as command and control, planning, coordination, communication, intelligence, deployment and support. A sense of history and a crystal ball would have revealed that a perfect confluence between doctrine and practice, plan and execution, need and availability has never been and never will be achieved in joint (or any other kind of military) operations. In virtually all situations such as the Dominican intervention, officers and enlisted men responsible for making and executing decisions have had (and will have) to anticipate the kinds of problems that have been inherent in mounting joint operations and to demonstrate an aptitude for flexibility, innovation, adaptability and plain common sense as much as a knowledge of what "the book" says to do. Had US troops in the Dominican Republic faced a well-organized, well-armed, well-trained, highly disciplined opponent, the problems experienced in mounting the intervention could have been, as General York implied at the time, very costly. Time was on the side of the United States in the Dominican intervention and it allowed the system to respond slowly to the unexpected demands placed on it. Time, as we have seen since, is not always so kind.

Notes

[1] Several English-language books analyze the origins of the Dominican crisis. See, for example, Abraham F. Lowenthal, *The Dominican Intervention* (Cambridge, MA: Harvard University Press, 1972); Piero Gleijeses, *The Dominican Crisis: The 1965 Constitutionalist Revolt and American Intervention* (Baltimore, MD: The Johns Hopkins University Press, 1978); Jerome N. Slater, *Intervention and Negotiation: The United States and the Dominican Revolution* (New York: Harper & Row, 1970).

[2] Telegram no. 1051, American Embassy, Santo Domingo, to Secretary of State, 25 April 1965, National Security Council (NSC) History of Dominican Intervention, Lyndon B. Johnson Library (LBJL), Austin, Texas.

[3] A more detailed account to the deployment of TG 44.9 and the evacuation of Americans from the Dominican Republic can be found in Lowenthal, 70 and 83–90; Quinten Allen Kelso, "The Dominican Crisis of 1965: A New Appraisal" (Ph.D. dissertation, University of Colorado at Boulder, 1982), 60–61 and 71–73; Herbert G. Schoonmaker, "United States Military Forces in the Dominican Crisis of 1965" (Ph.D. dissertation, University of Georgia, 1977), 26–28; CPT James A. Dare, US Navy, "Dominican Diary," *U.S. Naval Institute Proceedings* (December 1965): 37–42; MG R. McC. Tompkins, US Marine Corps (USMC), "Ubique," *Marine Corps Gazette* (September 1965): 34; MAJ Jack K. Ringler and Henry I. Shaw Jr., *U.S. Marine Corps Operations in the Dominican Republic, April–June 1965* (Washington, DC: Historical Division, USMC, 1970), 20–24 and 91–94; Entries for Tuesday, 27 April 1965, *Chronology of Dominican Crisis—1965*, LBJL; Lawrence A. Yates, *Power Pack: U.S. Intervention in the Dominican Republic, 1965–1966*, Leavenworth Papers no. 15 (Fort Leavenworth, KS: Combat Studies Institute, 1988), chap. 2.

[4] One complication developed during this preparatory phase when, to save time, CINCLANT (commander in chief, Atlantic Command) occasionally bypassed the four-star Army commanding general (CINCSTRIKE) of US Strike Command (STRICOM), Paul Adams, in order to deal directly with the Army and Air Force component commanders whose units had yet to be chopped to US Atlantic Command (LANTCOM). These violations of command procedures created confusion and forced CINCSTRIKE to send several of his staff to Fort Bragg and the adjacent Pope Air Force Base (AFB) to help Army and Air Force planners prepare the troops for deployment. The lapses in coordination between STRICOM and LANTCOM continued throughout various phases of the Dominican crisis, with no attempt to resolve the jurisdictional conflict until the intervention was over.

[5] U.S. Forces, Dominican Republic (USFDR), *Report of Stability Operations in the Dominican Republic*, pt. 1, vol. 2, sections 3 and 4; Schoonmaker, 86, and 96 n. 39; Ringler and Shaw, 30; J. D. Yates, *The Dominican Crisis*, Mitre Working Paper (Bedford, MA: Mitre Corporation 1973), 14; US Department of the Air Force (USAF), 464th Troop Carrier Wing, *History of the 464th Troop Carrier Wing, Pope Air Force Base, North Carolina, January 1965–June 1965* (1965), vol. 1, 36; USAF, *Case Studies of Air Power: The Dominican Republic Crisis of 1965*, Aerospace Studies Institute Project no. AU–434–ASI (Maxwell AFB, AL: Air University, 1966), 13; LTG Eugene Forrester, US Army, Retired, interview with author, Washington, DC, 11 November 1986.

[6] On the disruptive effects of BLUE CHIP V, See USFDR, *Stability Operations*, pt. 1, vol. 2, III–B–2 to III–B–4 and IV–A–7 to IV–A–8; USAF, *The Tactical Air Command in the Dominican Crisis, 1965* (Langley AFB, VA: Office of TAC History, 1977), 10–11; MG William E. Klein, interview with author, MacDill AFB, Florida, 4 November 1986; Forrester interview.

[7] Schoonmaker, passim; USFDR, *Stability Operations*, pt. 1, vol. 2, sections 3 and 4; USAF, *History of the 464th*, 35–36; USAF, *Case Studies of Air Power*, 9–12 and 17–19; USAF, ALTF TACOP Final Report, *Power Pack*, 24 May 1965, Simpson Research Center, Maxwell AFB, AL; USAF, *TAC in the Dominican Crisis*, 3–8; Klein interview; COL Stephen Silvasy, interview with author, Fort Bragg, North Carolina, 29 March 1985; LTC Earl E. Bechtold, interview with author, Fort Leavenworth, Kansas, 29 October 1987

[8] On "deducing" a mission for the 82d and the problems encountered in doing so, see USFDR, *Stability Operations*, pt. 1, vol. II, I–3, II–3, III–C–1, IV–A–2, IV–A–5, VI–3 to VI–4; pt. 1, vol. 1,

C–19 to C–20 and D–1; USAF, *TAC in the Dominican Crisis*, 5 and 8; Yates, *Dominican Crisis*, 14; Schoonmaker, 91; Lawrence M. Greenberg, *United States Army Unilateral and Coalition Operations in the 1965 Dominican Republic Intervention*, Historical Analysis Series (Washington, DC: US Army Center of Military History, 1987), 37; LTC Steven Butler, interview with author, Fort Leavenworth, Kansas, 21 March 1986; COL Eldridge R. Long, US Army, Retired, interview with author, Washington, DC, 5 November 1985.

[9] The 3d Brigade deployed without fighter protection, even though the plan approved by GEN Robert York and BG Robert C. Delashaw, called for F–100s to establish air superiority over Santo Domingo and provide escort for the initial assault force. The fighters remained at Homestead AFB, however, mainly because the Joint Chiefs of Staff did not want to chance further delays in the deployment of troops and because no one believed that Fidel Castro's air force would interfere with the airlift (the Dominican rebels had no aircraft). This gross violation of doctrine took place in the absence of any plan to conceal the deployment of the airborne units. To the contrary, Washington hoped initially that the publicity attendant upon the 3d Brigade's arrival at Ramey would be enough to discourage further bloodshed in Santo Domingo.

[10] Greenberg, 37–38; USFDR, *Stability Operations*, pt. 1, vol. 2, IV–B–1 to IV–B–2; Forrester and Klein interviews.

[11] Lowenthal, 116; GEN Bruce Palmer Jr., US Army, Retired, interview with author, Washington, DC, 4 November 1985; USFDR, *Stability Operations*, pt. 1, vol. 1, chap. 2, 2; Palmer, interview for Senior Officer Debriefing Program, US Army Military History Institute (MHI), Carlisle Barracks, PA, 152, 154–55 and 160; Palmer to Roger Spiller, 15 November 1983, letter in author's possession with Palmer's permission to cite. In the letter to Spiller, Palmer claims Wheeler told him that "once the situation was stabilized in the Dominican Republic, he intended to have the commander there report directly to Washington and to place CINCLANT in a supporting role." The "strenuous objections" of the Navy and Marine Corps prevented Wheeler from following through on his intentions.

[12] Palmer MHI interview, 156–57, 165–67 and 170–71; Klein and Forrester interviews; USFDR, *Stability Operations*, pt. 1, vol. 1, chap. 2, 7 and 9, enclosure 2 to chap. 4, 12, chap. 4, 4, vol. 2, II–19 to II–20; Lowenthal, 209 n. 8; Telegram, COMLAN (Palmer) to JCS, 0720Z 1 May 1965, Telegram, JCS to CINCLANT, 0026Z 1 May 1965, LBJL; Robert F. Barry, ed., *Power-Pack* (Portsmouth, VA: Messenger Printing Co., 1965), 65.

[13] USFDR, *Stability Operations*, pt. 1, vol. 1, chap. 4, 12, 14, vol. 2, II–23 and IV–A–12.

[14] LBJ also authorized Palmer to close the gap between the Marines and the 82d. To minimize casualties, the operation began at one minute after midnight, 3 May. Three battalions from the recently arrived 2d Brigade moved out from the 82d's position on the west bank of the Ozama River and, an hour and 14 minutes later, signaled the Marines. In the dark, a sniper's bullet ignited a brief exchange of gunfire between the paratroopers and the Marines; neither unit suffered any casualties. The newly established corridor isolated the bulk of the Constitutionalists in southeastern Santo Domingo, thus ending their prospects for a military victory. The crisis at this point entered a primarily political phase, with US units becoming a de facto peacekeeping force.

[15] USAF, *TAC in the Dominican Crisis*, 20.

[16] USFDR, *Stability Operations*, pt. 1, vol. 1, chap. 4, 13–14, vol. 2, II–19 to II–24 and II–26 to II–27; Entries for 30 April and 1 May 1965, "Alerting, Movement, and Execution Orders," LBJL.

[17] COL John J. Costa, telephone interview with author, 12 February 1988; USFDR, *Stability Operations*, pt. 1, vol. 1, chap. 2, 2, 19, chap. 3, 7, chap. 4, 5,12–13, vol. 2, II–20, II–22 and IV–C–4.

[18] USAF, *Case Studies of Airpower*, 35–39 and 41.

[19] This account of the command, control and communications problems that plagued Palmer during his first week in the Dominican Republic is based on Roger Spiller to General Wallace Nutting Memorandum, 30 September 1983, in author's possession; Palmer to Spiller, 16 November 1983; Palmer MHI interview, 158–60, 169–70; Palmer, interview with CPT Richard S. Switzer, 20 August 1974, 21, in Richard Switzer Collection, Hoover Institution Archives, Stanford, California; USFDR, *Stability Operations*, pt. 1, vol. 1, chap. 2, 7–8, chap. 4, 7–8; US Army Chief of Staff, *Challenge* (Washington, DC: Department of the Army, July 1964–April 1968), 39–40.

Chapter 12

Logistics in the 1990s

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Logistical Support for the AirLand Battle

Introduction. Maj. Gen. Albin G. Wheeler, Commandant of the Industrial College of the Armed Forces, outlines current doctrine and organization for logistical support of the "Deep Attack" posited by the AirLand Battle doctrine. He notes that the logistical support of such deep thrust operations poses many problems for the commander and logistical planner and operator and concludes, on the basis of war game simulations, that the key to success is likely to be flexibility and willingness to change plans and even concepts to meet the changing demands of the modern battlefield.

One of the more perplexing AirLand Battle issues facing commanders and logisticians is the challenge of supporting the deep attack. As General George S. Patton learned only too well in World War II, when you exhaust your supplies and run out of gas, you stop. What makes the problem even more complex given the nature of our current operations doctrine is that deep attack considerations cannot be separated from support considerations for the close-in and rear battles. To the logistician confronting operational realities, all three battles are inextricably linked. Success in supporting the deep attack depends on a well-formed ability to generate the means to shape and sustain a workable support structure across the depth of the entire battlefield.

Fortunately, there are many tools available to assist commanders and logisticians in developing workable operational concepts for support of the deep attack. The 2d Support Command (Corps) participated in a series of VII Corps computer-assisted simulations designed to explore the challenges of supporting the deep attack. The lessons learned were important not only for the individual value of computer simulation for solving operational problems (which we are just beginning to use) but also for the insights provided.

Reproduced with the permission of *Military Review* from Albin G. Wheeler, "Operational Logistics in Support of the Deep Attack," *Military Review* 66, no. 2 (February 1986):12–19.

In view of the ongoing discussion of the support of AirLand Battle in general and the deep attack in particular, let me share some of those insights. For the sake of clarity, rear battle concerns will be addressed first followed by activities designed to support the launch of the deep attack. Finally, the deep attack itself will be discussed.

The scenario used in the VII Corps simulation is not discussed. Suffice it to say that it was a doctrinally correct simulation of a deployed corps in Europe with the mission of conducting a deep attack to seize an operationally critical objective. A detailed treatment of the combat service support (CSS) considerations and general requirements to support such operations is discussed in Lieutenant Colonel Bloomer D. Sullivan's February 1984 article in *Military Review* entitled "Logistical Support for the AirLand Battle."

Rear Battle and Deep Attack

The rear battle should not be viewed as just the engagement area where CSS units repel the attacks of enemy airborne and heliborne units. It is also an integrated resource area of the same importance as the main battle area (MBA). It includes the intensity of close combat as well as logistical units fighting distance, time, interdiction and confusion to ensure that forward deployed tactical units are sustained and capable of continuing close and deep attack battles.

Forces in the corps rear area include such disparate elements as combat units and military police (MP) units, in addition to allied military units and CSS assets. These elements are organized and positioned to accomplish their particular support missions and to provide individual unit defense. The present system delegates to the rear area operations center (RAOC) the responsibility for base clustering and rear area operations. In effect, however, as was discovered during the simulations, RAOCs function more as terrain monitors than as command and control agencies.

To support a deep attack, the corps rear area requires centralized command and direction on the same order as a division sector. Without this centralized control, CSS units will be unable to project support forward. Someone must be in charge and have the staff to ensure an orderly flow of information and orders. The simulations showed that this function must be assigned to the corps commander as the overall corps battle captain.

The corps commander delegates the 24 to 48-hour battle to his division commanders. He must plan the 72 to 96-hour battle for the corps. In like manner, he must direct the organization of the corps rear to project the maximum CSS forward to the combat force.

Units which habitually occupy the rear must be equipped to adequately defend themselves. Their present capabilities are limited to machineguns and grenade launchers. This is unsatisfactory. The results of the simulation supported the US Army Logistics Center's initiatives to enhance the self-defense capabilities of the CSS units of the Army.

CSS units cannot and should not expect substantial combat forces to be dedicated to rear area defense. They must be able to stand up against an encroaching

enemy force and defeat it without requiring the diversion of combat strength from the main battle. The initiatives of the US Army Logistics Center will not make every CSS unit the equivalent of a tank battalion in combat power, but they will allow CSS units to execute a viable self-defense mission.

The key to support of the deep attack starts with the organization of the corps rear. It must be equipped and manned to execute the dual missions of support and defense. It must be under a central command agency orchestrating operational requirements and priorities in the rear and assigning missions to support those requirements.

A subset of the larger problem of command and control in the corps area is movement control and terrain management. The present doctrinal approach to movements addresses the control of main supply routes (MSRs) as a separate concern. MSRs are only a part of the total terrain management problem. Unit locations, access to support areas from MSRs and the continuous defense of MSRs must be integrated into the overall support and defense plan of the corps area.

Launching the Deep Attack

The control of MSRs must be combined with the control of terrain to allow the tailoring of corps support forces to support the deep attack battle plan. This is above and beyond the normal traffic circulation mission now performed by the movements control system. Without this terrain management authority, the control of unit and vehicle movement throughout the corps sector will be impossible. Vehicles and convoys will continue to clog routes with "local" moves, recovery operations and infiltration operations.

A second insight developed from a focus on the tailoring of resources and units needed to support forces executing the deep attack. These units—combat support (CS) and CSS—must be positioned forward to provide support to the deep attack force prior to crossing the forward line of own troops (FLOT).

This can and probably will cause the displacement of these units, thus adding to the congestion and movement problems associated with normal FLOT and maneuver activities as well as the movement of the deep attack force. Once refueling and recovery is completed, these units will have to return against the continuing forward movement of maneuver units. Who determines the priorities of movement and routes in an area controlled by a deployed division—an area where numerous combat, CS and CSS units will be competing for routes and establishing positions to support the deep attack force?

Units supporting the deep attack will include engineer, field artillery and aviation units, in addition to ammunition and fuel vehicles of the corps support command. All of these elements will certainly try to take the necessary actions to successfully execute their individual missions, many times to the exclusion of other units' requirements. If the highway network is not intensively managed, the deep attack force will come to a standstill before reaching the FLOT.

Although the corps G3 issues orders for unit missions, he does not analyze and establish priorities for the terrain and movements requirements of these units. In

like manner, the corps movement control center (CMCC) or the division transportation officer (DTO) alone cannot establish the priority of movement on routes of advance and MSRs crossing corps or division boundaries and eventually projecting across the FLOT. A coordinated effort between the corps staff, CMCC and DTOs is required to ensure the rapid movement of the attack force as well as supporting units.

A final insight concerns the determination of support priorities for the different forces (the deep attack force versus the MBA force). This decision will have to be made not by assigning first, second or third priority to units but by analyzing requirements versus capability and risk in each area of support and making tradeoff decisions by area. This is especially true regarding ammunition, fuel and transportation assets. This must be the corps commander's decision based upon his staff's recommendations. In turn, these recommendations must be made after a careful risk analysis of the missions of the corps and its subordinate units. The incorrect allocation of these assets could lead to the defeat of major subordinate elements and thus the failure of the corps to execute its primary mission, to say nothing of failing to successfully execute the deep attack.

Executing the Deep Attack

It was determined that an attacking force of the size envisioned in the simulations—roughly a reinforced division—could operate for three to four days with organic supplies. This would allow resupply during a subsequent lull in combat after the seizure of the objectives. This assumption of a self-sufficient attack force did not provide the insights desired, so several other possible support scenarios were simulated. How would terrain affect the attack? How would enemy dispositions affect the ability to support the deep attack? How does the corps ensure the orderly forward movement of supplies and support?

Focusing on terrain proved to be very useful. When a tactical axis of advance is chosen without consideration of rail or road networks, it poses no problem for tactical vehicles maneuvering cross country. In contrast, it presents significant problems for transportation assets. Current support vehicles are essentially confined to hard surface roads. Initially, these vehicles are the only viable answer to the large tonnage requirements of supporting a division in a deep attack. Although aerial resupply looks good, aircraft survivability and lift capability become major limitations. Aircraft alone are not sufficient to move the thousands of tons of ammunition and hundreds of thousands of gallons of fuel needed to support large-scale operations.

At the corps level over the long term, rail is the preferred method of support due to the magnitude of the support problem. But the rebuilding of rail lines cannot be quickly accomplished in the forward area of the battlefield. Thus, terrain remains critical here too. A fundamental consideration when choosing a deep attack axis must be the influence of terrain on the mobility of support assets.

Assuming sufficient road and rail nets are available, however, does not necessarily solve the deep attack support problem. Routes must be cleared, secured and

repaired. The DTO is not staffed to control these MSRs and must rely on MP or host nation support units which may already be committed to security, prisoner of war and refugee missions. The CMCC has organic highway regulating teams but not in sufficient numbers to regulate MSRs in the corps rear, much less to augment a division. Providing these teams to a division could mean degrading the support capability in the corps rear, but this is a risk which must be assumed to ensure the positive control of traffic in the deep attack force sector.

In like manner, the corps engineer work line must be moved forward onto the deep attack axis. Priorities switch from countermobility to mobility missions for corps engineer units. Division engineers must be free to execute tactical mobility missions, with corps assets picking up the missions behind them.

Enemy dispositions raised two corollary issues—the securing of the shoulders of the penetration and the flanks of the corridor behind the attack force. Decisions on securing these areas will determine the method of resupply for the attack force. If the corridor is not secured, corps and division transportation assets moving stocks forward can be decimated by relatively small enemy ground or air forces. Supply vehicles are highly vulnerable, and combat forces may not be available to conduct convoy protection.

The results of the simulation suggest that the security of support elements will be a major factor in any deep attack. Only two options were found—attachment to the deep attack force or operations down an open corridor. Although this sounds like an easy decision, remember that it will require 70 to 80 5,000-gallon tanker loads to replace the fuel burned by a division in 50-kilometer attack. The decision matrix becomes more complex. When the unit basic load (UBL) replenishment requirement is added to the equation, it will require approximately 140 trucks and tankers.

To move this many support vehicles, in addition to division assets operating along the attack axis, requires several passable MSRs and staging areas to down load cargo. These are lucrative and highly vulnerable targets. Moreover, the issue becomes critical because UBL replenishment must occur prior to the deep attack force being engaged by follow-on enemy forces. As the simulation participants learned, the only portion of the required resupply which might be reduced is ammunition. If the ammunition expended is less than expected, the resupply requirement is lessened.

Given the choice of attachment versus open operations, the second part of the problem lies in the recovery of the support assets. Most deep attack scenarios carry the attack through the seizure of the objective and the presumed collapse of the enemy front. There is a real possibility that enemy resistance will not collapse, and the deep attack force with its supporting elements may be temporarily isolated in the enemy rear. How will transportation assets return to the corps rear to pick up ammunition and fuel? More realistically, how will they survive?

Based on simulation experiences, the solution to the problem of supporting a deep attack can be ordered from the most to the least advantageous. The optimum method is for attacking units to secure rail lines up to the brigade areas. These could then be rapidly repaired. The next best option is to establish a secure corri-

dor with sufficient repaired and secured routes to allow truck traffic to move both ways. Finally, the only viable solution may well be the attachment of the corps' support assets to the attacking force.

When this is done, the division commander must plan for the movement, defense and control of these assets, possibly straining his already overloaded organic CSS structure. But this may be the only method of ensuring the supplies get to the unit on the objective. Consequently, attachment must be considered by CSS and tactical planners.

These types of CSS considerations must be weighed by corps planners as part of their initial estimates. If they do not engage in risk analysis oriented on the total mission from the beginning, to include all implied CSS tasks, the corps staff risks recommending a tactical operation which is impossible to support logistically.

CSS planning to support a battalion or brigade-sized attack is much easier than that required to support a division or multidivision attack on a narrow front. Although the Army is designing weapon systems that fire faster and move more effectively cross country, the supply system still depends on rail and large fleets of trucks. The trucks do not have cross-country mobility, but they are key to moving the thousands of tons of supplies and millions of gallons of fuel required to support the high-technology battle.

It is our sensing, as a result of the simulations, that the Army has more conceptual work to do. It is time to develop a definitive doctrine for organizing the corps rear area. Support missions, defense considerations and terrain management must be brought under effective command and control to support the tactical battle forward. The procedures and mechanisms for the logistical support of large forces conducting the deep attack, to include large-scale airmobile operations, must be addressed in greater depth. The present thinking and proposed solutions may work at the tactical level but may not be applicable at the operational level.

The task organization of supporting units and their relationship to supported units must be examined on a risk-versus-benefit basis. This is especially true since fire rate and speed are being used to offset more ponderous protection and fixed lines of communication. Finally, we must all take a harder look at "improvisational CSS," including spontaneous initiative, adaptivity and scavenger or forage logistics. Realistic methods of obtaining fuel such as on-board pumps and other CSS improvisations need to be assessed, developed and implemented.

As the VII Corps simulations showed, once the shooting starts, there is little distinction between tactics and logistics. Logisticians have to be tacticians, and tacticians must be logisticians. The key to success is that the logistician and tactician understand the interdependence of all functions within the AirLand Battle.

In the final analysis, we found that success and victory on the simulated battlefield were due as much to our disregard for preconceived logistics plans as to their implementation. In the final account, *it was the willingness, or lack of it, to override plans, to improvise and to take risks that determined the outcome.*

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Logistical Coordination Between Allied Forces

Introduction. In this article Col. Albert S. Britt, Jr., reviews American experience with cooperative logistics in World War I, World War II, Korea, and in the NATO environment of the late 1950s. His observations on the difficulty of providing logistical support to another nation (or receiving it) are as applicable today in the era of "Host Nation Support" as they were in the late 1950s. Britt concludes with nine observations, or lessons learned, by the United States Army in the twentieth century in the field of cooperative logistics.

For the first time in her history the United States is maintaining during a period of peace large military forces both at home and abroad. In addition to the partial mobilization of the military forces, the country also is in a state of partial industrial mobilization. The allies of the United States likewise are mobilized to various degrees, both militarily and economically.

Partial mobilization is expensive; so is military aid to our allies. The American people probably are more conscious and better informed of the cost of the Military Establishment today than at any time in our history. It appears appropriate, therefore, to study the problem of logistical coordination between allied forces at this time.

From our study some lessons should emerge which can be used as a guide for the future. This was the hope of Charles Gates Dawes when be steered the committee in preparing the Report of the Military Board of Allied Supply following World War I. The lessons did emerge from this report, but there is little evidence that they were applied in World War II.

World War I

Before the outbreak of World War I the British and French realized that some coordination between their respective forces was required. A few inconsequential

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staff visits took place, but nothing much was accomplished until the war was in progress and the supply situation of the British became perilous. Then the British Minister of Supply went to France to confer with the French Minister of Munitions on how "to secure adequate guns and ammunition for the British Army on the required scale." This meeting started logistical coordination at the top and probably was the first stab at the problem in modern times.

As it became increasingly clear that a supreme commander was necessary, the prime ministers met in Paris to define the terms of office for the commander in chief (CinC), to be. It already had been agreed that he would be a Frenchman. The French produced a draft of the terms of reference which included, without the prior knowledge of General Haig, the British Commander, the following: ". . . allotment of material and resources to the armies," and "The French Commander in Chief (will have under his orders) the (British) Quartermaster General." As expected, General Haig took immediate and violent exception to his logistical support being placed at the orders of someone else.

The French abortive attempt to strengthen the hand of the CinC in the field of logistics caused Haig to doubt that the French were playing fairly and frankly with him. Accordingly, he bitterly denounced these terms and threatened to resign unless they were withdrawn. The British Prime Minister, although favorably inclined toward the French view, finally supported Haig. Had this matter been more adroitly handled, it is quite likely that a supreme commander for logistics, whether the CinC or one of his subordinates, might have been adopted.

Later the French proposed the pooling of all material resources, but the British opposed this because their supply situation was critical at the time due to the intense submarine warfare against their shipping. Eventually the British did agree in principle to the pooling of common use items. The British-French Munitions Council allocated these items between the two forces, but there still remained problems, even in such elementary areas as rations. The British ration scale was twice that of the French and Italians; later the Americans further complicated this problem by demanding twice the scale of the British.

On the Eastern Front the Russian armies were bogged down almost from the beginning due to a lack of adequate war matériel reserves, no plan for industrial mobilization, and an inflexible industry that found it difficult to shift to war production. Russia asked for help, but the British and French factories already were taxed to supply their own forces. In the end, the French did send some considerable supplies to Murmansk, but they arrived too late and remained unused until the Revolution.

It is worth noting that there was coordination between Russia and the Western Allies in the field of strategy, but logistics was overlooked until matters became critical.

By the spring of 1918 the Americans had joined the Allies in agreeing to the appointment of Marshal Foch as commander in chief in the field of strategy. Soon it became urgent that a similar high command be established to deal with allied logistical matters. Accordingly, Brigadier General Dawes, General Pershing's Purchasing Agent, drew up the charter for the Military Board of Allied Supply. The

board, which was to "systematize" supply relations between the Allies, became operational the end of May 1918.

Shipping was the key to US participation in the war. As a result of the shipping shortage caused by increased demand and sinkings, the allocation of all ocean shipping space was vested in the Allied Shipping Control Committee. This committee was predominantly British, since most of the shipping was of that origin; and the balance largely of European registry. No US cargo ships were produced in time to be used before the armistice.

To cope with the many supply problems arising out of relationships with the French and British, General Pershing set up a "Coordinating Section" within his general staff for this expressed purpose. This section was the forerunner of the familiar G4 Section of today. Later the entire staff was reorganized into the familiar G1, 2, 3, and 4 Sections because this breakdown more or less paralleled the French bureaus and facilitated work between the two headquarters. This arrangement still required an extensive liaison organization at each staff level and each technical service.

Procurement

Local procurement became a thorny problem since US policies had not been coordinated with the French. After a few trials and errors all procurement amounting to 2,500 francs or more was funneled through the United States Purchasing Board in Paris. This agency coordinated with the Military Board of Allied Supply. Upon approval the request was forwarded to the *Commissariat Général des Affairs de Guerre Franco-American*. This agency in the French War Ministry set price ceilings, allocated resources between the French civilian economy and the military, and directed procurement by the appropriate French technical service.

After procurement the French technical service shipped the commodity to the corresponding US technical service and distribution was effected through US channels. A similar procedure was worked out for procurement made in Great Britain.

The extent of foreign procurements in World War I can be seen from a few examples:

1. *Ordnance.*—Over one-half million tons were procured in Europe. The French 75-mm field gun was adopted by the US Army to facilitate interchangeability of weapons, ammunition, and spare parts with the French. All railway guns were of French design. All 8-inch howitzers were of British design and most of British manufacture.

2. *Aircraft.*—Two-thirds of the airplanes of United States air service were of British or French manufacture; all were of European design.

3. *Tanks.*—The US tank corps was dependent entirely upon France and Great Britain for tanks. Although US tank production was initiated before the armistice, none were received in Europe up to that time.

Coordination with the French was necessarily very close in the field of transportation. As a result of this experience the United States Army adopted the French procedures for rail traffic regulation. In general these procedures survive to this

day. The Americans also learned how to regulate motor transport from the Allies. Foch had a large international motor pool established to move the strategic reserve. The American contribution to this pool amounted to 8,000 trucks complete with drivers, mechanics, and maintenance facilities.

Germany and her allies had similar problems in the logistical field. However, there was greater central direction to their combined effort than among the allies. German divisions and munitions skillfully were used to coerce or reinforce her allies. These measures held together the German alliance right up to the end; otherwise Bulgaria and Austria would have sought a separate armistice.

It is interesting to note that the French member of the Military Board of Allied Supply attributed the Allied victory to the work of the board, and the defeat of the Germans to their inflexibility in organizing their logistics. Unfortunately, he offers nothing to substantiate his statement.

World War II

When the United States entered World War II, a few of the World War I problems and pitfalls in logistical coordination were avoided. The British were, as ever, skilled in the conduct of coalition warfare, and since they were the principal ally of the United States, progress in coordination went forward more smoothly than in World War I. Experiences from that war had been studied in the service schools and colleges of both countries.

The pattern for the command structure for US forces in Europe, both strategic and logistical, was taken from World War I experience. Indeed, the terms of reference for both Generals Eisenhower and Lee were drafted from the Letters of Instruction to General Pershing in 1917 and 1918.

As American troops built up in the United Kingdom, the British undertook a 700 million-dollar construction program to provide housing and other accommodations for these troops. The funds for this construction were provided by the British, and constituted a reverse lend-lease contribution.

As time went on both British and American authorities became annoyed with each other over the construction program. The Americans were impatient at the bureaucratic red tape and the general lack of urgency in getting on with the job, while the British were irked at the Americans for continually changing their plans.

In spite of the annoyances on both sides, one must admit that the preparations made by the British for their Allies were certainly noteworthy; particularly so as the effort was made at a time when their limited resources already were strained.

In addition to this example of lend-lease, during 1942 one-third of all tonnage required by US forces in the United Kingdom was provided by the British. For the Fiscal Year 1943, for example, 50 percent of all supplies and equipment for the United States Air Force in Great Britain was furnished from British sources. In addition, up to the Normandy landing, 63 percent of all quartermaster supplies came from the British.

Some measure of the extent of reciprocal aid, or reverse lend-lease, as it is referred to generally in the United States, which resulted largely from logistical coordination with the British, can be seen from the total of the British contribution: seven billion dollars. This compares with about 30 billion dollars which the United States contributed to Great Britain.

As General Eisenhower stated in his Final Report to the Combined Chiefs of Staff:

> The United States of America and Great Britain have worked, not merely as allies, but as one nation, pooling resources of men and material alike in this struggle against the forces of evil engendered by Hitler's Germany.

The coordination of logistics in this combined force was facilitated by having a completely integrated combined staff for the supreme commander. This staff developed under the direction of General Morgan, British Army, who was charged with organizing and planning for the invasion of the Continent before a supreme commander was appointed.

In the Southeast Asia theater Admiral Louis Mountbatten had a predominantly British force, although there were sizable contingents of American troops there. He recognized the necessity for a partially combined staff to ensure coordination between British and American troops. Notable examples were in the fields of medicine and aerial supply.

German-Italian Supply

German-Italian experience paralleled that of the Allies in some respects. Their problems in maintaining Rommel's troops in Africa have been recounted in numerous works since the end of the campaign. According to Rommel the principal supply problem can be attributed directly to a lack of coordination and cooperation on the part of the Italians. Although the bulk of the supplies for the *Afrika Korps* were German in origin, the line of communications through which these supplies had to move was Italian. North Africa was an Italian theater of war and the over-all responsibility for the conduct of operations was vested in the Italian-African command.

It appears that it was not Hitler's intention to become involved in Africa. After the collapse of Graziani's armies, the Germans were compelled to help out for fear their partner might quit. Rommel, thereupon, was sent to Africa with two divisions to assist ("bolster" might be a better word) the Italians. In this role he became subordinate to Graziani's successor, General Bastico, CinC Italian-Africa command. As a consequence the Germans were dependent upon the Italians for logistical support in the field. Base service, depot supply, and higher echelon maintenance were all Italian, with a sprinkling of German technicians.

Rommel reported time and again that this arrangement was unsatisfactory, and he attributed his defeat largely to the unsatisfactory supply situation.

In principle the supply of forces in the Axis was a national responsibility, similar to the policies of the Allies. In part, the North African theater was a departure

from this principle. In this case a major force of one country became dependent for logistical support upon another, and weaker, nation.

Needless to say, German-Italian war planning had not taken logistics into account. Apparently there was very little coordination between the two countries in the field of industrial mobilization and general logistical planning. No attempt was made to standardize arms or equipment, nor coordinate the production of items which could be standardized. Some effort was made in the later stages of the war to send German technicians to Italy to assist in producing certain types of war material with which the Italians were unfamiliar; but even this was on an ineffectual scale. When it became urgent that the Germans give the Italians some logistical help, the solution generally was to produce the item in Germany and send it to the Italians. Specialists and technicians frequently accompanied the item to assist in the installation and training of the users.

After the loss of the North African Campaign, the Italians became more and more dependent upon Germany for logistical support, even in Italy.

Korea

The logistic support policy for the various national elements of the United Nations Command, including the South Koreans, was that each nation assume responsibility for the logistic support of its own forces. Support in kind obviously was infeasible for many of contingents; in these cases the United States furnished the supplies and equipment on a reimbursable basis. In other instances, US equipment was issued as an expedient and the bookkeeping was done later.

Many special problems new to Americans arose in the supply of forces from many lands in the course of operations in Korea.

The Abyssinian force was equipped with every make rifle they could obtain. It soon became necessary to issue US arms in order to maintain ammunition supply. The problem then really became acute when it was learned that the Ethiopian custom required that a warrior return home with the same weapon with which be departed, else it was an indication of personal defeat!

Rations for the Moslems created a problem when the Turks arrived in Korea. Their religion prohibited the eating of pork, a common ingredient of the "C" ration. This problem eventually was solved through the cooperation of the Moslem religious leaders who granted a dispensation to the Turks fighting in Korea.

The customary practice of ration issue in the Korean Army varied from US practice and led to some confusion in the beginning of the campaign. The Korean ration is divided into a staple portion which is issued, and a fresh portion for which a monetary allowance is given to the commander for local purchase. Obviously, this could not go on during combat. Yet the only ration available was the United States "C" ration which soon proved too large in both quantity and type. Furthermore, this ration cost $2.00 at the time, compared with the few cents which the Korean ration cost. This problem was solved by procuring in Japan an oriental type of "C" ration catered especially for the Korean appetite.

A further problem arose with the Koreans in regard to combat boots. The tariff sizes issued by the US Quartermaster are based upon the average sizes of American feet and clearly were too generous for the Koreans. This problem was solved by instituting a "boot cut-down" project in Japan for the Koreans.

At considerable effort and expense the US Quartermaster provided live lambs to the Greek contingent for a religious rite, only to find that the lambs were not entirely suitable, as they should all have been female lambs.

NATO

From the outset logistics have been an important consideration of the supreme commander of NATO forces.

In his first and last report as supreme commander of NATO forces, General Eisenhower called attention to the fact that the United States had provided most of the resources for NATO up to the spring of 1952, the date of the report. However, he continued, the American taxpayer should not be expected to continue carrying the load indefinitely unless other nations showed cooperation and enterprise in improving their own defenses.

In a subsequent report of the supreme commander, attention was called to the fact that improvement had been substantial, but there still remained considerable room for improvement. This was apparent from a remark to the effect that the principle of national responsibility for logistical support resulted in a lack of flexibility within his command and that he had made proposals for overcoming this rigidity. Presumably some of the allies had not adequately supplied their part of support for their forces. Under these circumstances the supreme commander apparently felt that in the absence of any other recourse he was compelled to seek authority to supply the delinquents out of resources on hand in other national forces. This is certainly treading on tricky ground.

If the foregoing presumption is correct, it is difficult to see how the cross transfer of supplies could work out satisfactorily in practice. To focus on a specific case, among the forces of SHAPE, US forces probably are the most adequately supplied. Adjacent to the American forces are the French who are practically at home, while the Americans are at the end of a 4,000-mile pipeline. The French can afford to have less stockage than US forces. If the resources are then pooled, US forces will be placed in a very tenuous position.

It is understandable that the supreme commander, or any other commander for that matter, must realize that the command as a whole is only so strong as the weakest link. If he can strengthen that link, he must surely do so.

A better solution than cross-servicing would seem to be the provision of logistical support through channels other than the battlefield distribution system such as lend-lease and the Mutual Defense Assistance Program. In effect, this was the procedure followed in Korea.

The military burden for each country in NATO was determined by a team under the International Secretary, Lord Ismay, and agreed to by member nations. There should, therefore, be no real necessity for cross-servicing or pooling if each nation does its bit.

The financial responsibility for large-scale undertakings which comprise the infrastructure is prorated among the various member nations through agreements at ministerial level. The United States has underwritten a large part of the total cost to date.

A rather novel feature in the buildup of NATO forces has been the effort placed upon developing a European Arms Production Base to support the logistical requirement. The most recent addition, of course, is the phenomenal German industrial machine. Originally, the rearmed German forces were to receive their base logistical support and heavy war equipment from allied sources. This now is changed, and one can expect that a strong arms production base will develop in Germany.

Under the NATO Defense Production Board a survey of defense production capabilities was made for the purpose of coordinating war production. Mr. Herrod, the distinguished Englishman who headed the board, made two observations regarding the use of European factories for war production at that time (1951). First, price fixing was essential to ensure coordinated procurement, and second, many of the factories would require "financial stimulus" to get them into arms production. The necessary stimulation has come about through the United States Offshore Procurement Program. With that start, production appears to be well in hand.

Summary

Logistical coordination between allies obviously is influenced by the way in which the various members of the alliance operate. General Morgan in his book, *Overture to Overlord*, concluded that United States and British procedures for administration were so irreconcilably opposite that he charged his administration section with keeping the two systems "as severely apart as possible." However, his administrative section, staffed with both British and American officers, did coordinate all administrative (in British parlance the term includes logistics) planning for OVERLORD in the early stages.

The US press had coined descriptive terms to differentiate between nations which are considered rich or poor, the "have's" and the "have not's." Without question, this is a basic factor. It follows then that one's allies will require logistical help according to whether they are "have's" or "have not's." During World War II the Free French Forces lost their homeland, and with it the capability for supporting their forces from French resources. As a result they were almost completely dependent upon the Americans and British for logistical support. This was the reverse of the situation in World War I when the United States forces were almost equally dependent upon the European Allies.

In World War I the Russians made the mistake of bringing Romania into the war without first finding out that the Romanian Army would be almost a complete logistical liability to the Russians. Romania had no war reserves and no means for producing them. Consequently, she looked to Russia for even the initial issue of arms to her reservists. Sorely lacking in equipment, Russia now found herself bound to share with her new ally. In the end, Russia sent troops to operate under

the Romanian High Command, rather than equipment she could secure only by withdrawing from her own soldiers. Even the most casual coordination of logistical matters between the two countries would have disclosed that the Romanians would have been more valuable, indeed more willing, as neutrals than the logistical burden they turned out to be.

Our public officials seem to have left little doubt that requirements of the allies which cannot be met from abroad will of necessity become demands upon the United States during war. Since so many of the allies require assistance from the United States during peacetime, so much more so will they be dependent if war should break out. For the foreseeable future no major power could become involved in all-out war with the Soviet bloc without major logistical support from the United States.

Thus the "have" nations of any coalition will be called on for logistical help by the "have not" nations. Many of the misunderstandings between the allies stem from this basic factor, and the fact that so many nations are in the "have not" category.

The program through which our allies are receiving logistical help today was established by the Mutual Defense Assistance Pacts.

In effect, the MDAP's continue the principle of US military aid to allies just about where lend-lease left off at the end of World War II. It also is a companion to Marshall plan type aid, in an economic sense. The underwriting of military equipment and offshore procurement of military supplies are the means by which the United States is aiding the allies in the general field of logistics. The over-all plan in Europe is coordinated by the Supreme Allied Commander Europe (SACEUR), who also is the NATO Supreme Commander, through the various Military Assistance Advisory Groups. This dual relationship of SACEUR ensures a certain amount of coordination and gives some assurance that the aid is related to the over-all objectives of the United States.

Some of the allies do not have the industrial base for the production of their arms and equipment. Offshore procurement is intended to build up a production base in Europe so that the NATO countries will be able to produce their own arms.

This has brought about a requirement for the standardization of equipment which, in turn, requires standardization of terms.

Clearly, standardization of equipment must precede any large-scale standardization of organization, tactics, or logistical procedures. It also must precede any effective pooling of supplies. In some cases it may not be desirable to standardize. For example, cases have been cited where pooling of rations was not feasible because of the difference in standards.

During World War I the French and Americans successfully pooled ammunition. On the other hand, attempts at pooling between the French and British were not so successful, largely because the equipment was not standardized.

Much has been accomplished recently in the field of standardization, but it is doubtful if much more can be achieved profitably for the time being. One sure way to standardize equipment is to make gratuitous issues to one's allies.

Overemphasis on standardization can nullify the strength of customs and traditions. There are times when these matters are more militarily valuable than stan-

dardization. It is necessary to guard against the zealot who sometimes appears to push standardization for standardization's sake rather than the achievement of military effectiveness.

A coalition engenders a certain amount of distrust among the members. Napoleon is alleged to have said that he could defeat any coalition because of the indecision and diverse interests of the allies. He was right except for a couple of times. Nevertheless, there is great merit in Napoleon's thesis.

An example from World War I illustrates the lack of confidence between Allies: The Germans made great gains in the spring offensive of 1916, and it seemed probable that the Allied positions would be penetrated. At one and the same time, the French secretly were planning a withdrawal toward Paris which would have uncovered the British right flank; and the British were considering a withdrawal which would cover their evacuation ports on the channel, thus leaving the French left flank uncovered. Fortunately, neither plan had to be put into effect.

The problems inherent in the coordination of logistics among allies of different language are so patent as to not require emphasis. Even though highly skilled interpreters and liaison personnel are employed, as with the French in World War I, it is quite difficult to find common grounds for a thorough understanding. All agreements involving logistics also involve money in the final analysis and must be recorded in precise language to avoid as many misunderstandings as possible.

If the ally is impecunious and mutual agreements are not precise, it can be expected that he will take advantage of every opportunity to escape commitments; this may not necessarily appear dishonest to him.

The command structure of a coalition affects logistical coordination in an allied force.

The supreme commander of an allied force normally exercises only operational control of the forces in his command. Nevertheless, he must concern himself with the state of logistical support for these forces to ensure that they can fulfill the missions assigned.

Whether we like it or not, each nation has certain national characteristics which distinguish it from other nations. These characteristics play, at times, a decisive part in military operations within a coalition.

In this regard it is worth noting the comment of a well-informed German general of World War II regarding the characteristics of various nationalities when working together as allies. His views were that the British are trained to operate in a coalition. These matters are studied in their service schools and from long tradition they are psychologically and emotionally adapted to the problems which arise. He felt the Germans were too impatient and the French too arbitrary. The Americans he felt were a mixture of the French and German attitudes. He also noted that the British were very tolerant of their allies, a characteristic not enjoyed by the others.

Like national characteristics, each nation has standards and customs of its own.

Conclusions

From this study of coalition logistics, certain conclusions emerge which should form the guidelines for logistical coordination between allied forces in future wars, both hot and cold. Most of these conclusions stem from human motives and reactions; therefore, they should be as valid for nuclear warfare as for conventional.

1. The principal obstacles to the coordination of logistics among allies have their roots in finances. Generally speaking, the more impecunious the ally, the more difficult the solution to the problem, unless resort is made to grants.

2. The problems are not by any means confined to relationships between the United States and her allies. In two wars the Germans have faced similar problems.

3. The British handling of the problem has won the respect of friend and foe alike. One would conclude that their methods warrant study.

4. Some over-all authority, other than a committee, is essential for the coordination of logistics in a coalition. Because of the financial implications, it certainly will be difficult to secure the necessary delegation of authority.

5. Lack of proper coordination can spell disaster, as Rommel found out in the North African Campaign.

6. It seems risky to commit combat reserves for cross-servicing, unless the stockages reflect a cross-servicing requirement.

7. Some form of military aid such as lend-lease or MDAP seems better than cross-servicing in the combat area.

8. The good will of allies can be lost easily at the same time that valuable aid is being given if due consideration is not given to the customs and standards of allies.

9. Standardization is a prerequisite for broad pooling of resources.

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The Logistical Support of DESERT STORM

Introduction. In 1990–1991 Operation DESERT SHIELD/DESERT STORM provided the first major test for the new doctrine, organization, and equipment developed for our armed forces in the late 1980s, a test which was passed with flying colors. In this article Lt. Gen. William G. Pagonis and Maj. Harold E. Raugh outline the logistical problems faced in deploying and sustaining the ground forces which conducted the largest armored combat operation ever seen. General Pagonis is well qualified to discuss the subject inasmuch as he commanded all Army logistical forces in the Gulf and was responsible for the logistical plans which enabled allied combat forces to defeat Iraqi forces decisively in just 100 hours of ground combat.

The overwhelming victory in Operation DESERT STORM was due not only to the unparalleled proficiency and unequaled confidence of the US forces' combat soldiers and leaders, but also to the highly successful implementation of an effective and farsighted logistic plan and operation.[1] The theaterwide logistic support of all US soldiers and their equipment in Southwest Asia was a spectacular accomplishment. At the start of the ground phase of DESERT STORM (24–28 February 1991), the 22d Support Command (Theater Army Area), along with the 1st and 2d Corps Support Commands (COSCOMs) from the XVIII Airborne Corps and VII Corps, respectively, was responsible for sustaining more than 300,000 soldiers in 12,400 tracked combat vehicles and 114,000 wheeled vehicles. These forces were organized into two full Army corps and located in a harsh and inhospitable region where no military logistic infrastructure had existed previously.

Indeed, the foundation for the total success of DESERT STORM was, in large measure, laid carefully during the previous two months when the 22d Support Command, with the 1st and 2d COSCOMs, developed the theater logistic support

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plan. The logistic plan was executed with unsurpassed efficiency and success by logisticians in the combat units, the forward support battalions, the divisions and corps supports commands and the 22d Support Command.[2]

Formation of the Support Command

On the morning of 2 August 1990, Iraqi forces invaded Kuwait. Six days later, after hasty planning and coordination due to the short notice involved and urgency of the situation, a small group of logisticians from US Army Forces Command (FORSCOM) J4 (Logistics Directorate) and the Pentagon arrived in the Kingdom of Saudi Arabia. On the plane en route to Saudi Arabia, they formulated the original plan of what was later to become the mission of the Support Command (SUPCOM), This plan contained three major tasks: the reception, onward movement and sustainment of the force deploying to Southwest Asia.

Since the National Command Authority had made the decision to immediately send combat units of the XVIII Airborne Corps to Saudi Arabia ahead of their support elements to deter Iraqi aggression, the small group of logisticians that landed on 8 August 1990 became the nucleus of all logistic support for Army troops arriving in country. Shortly after the arrival at Dhahran of the first elements of the 82d Airborne Division, a decision was made that a support command was needed to control all logistic support in the theater of operations. This decision was based on the lack of an Army logistics infrastructure needed to feed, shelter and supply the large number of soldiers arriving in Southwest Asia. It was further decided that the airfield at Dhahran and the ports at Ad Dammam and Al Jubayl would become, respectively, the APOD (aerial port of debarkation) and the SPODs (seaports of debarkation).

The SUPCOM, assisted by the 1st COSCOM from the XVIII Airborne Corps, immediately assumed all theater logistic responsibility. It took over responsibility for the APOD and, between 10 and 25 August 1990, received more than 40,000 troops from the XVIII Airborne Corps. An area support group and an area support battalion were also quickly formed. Additionally, the first elements of the 7th Transportation Group arrived in country on 12 August, became a major subordinate command of the SUPCOM and began planning to receive equipment at the ports, especially the Army, Marine and Air Force equipment on pre-positioned ships from Diego Garcia. Their cargo of food, tents, materiel, supplies and ammunition proved to be invaluable.

The SUPCOM headquarters initially consisted of only two elements: a command element and a logistics operations center (LOC). The LOC was the nerve center for the reception, onward movement and sustainment of all troops and equipment coming into country. The LOC, operating on 36-hour shifts, was initially manned by the handful of logisticians and in-theater liaison officers from each unit that arrived and by other borrowed military manpower. Another 18 handpicked logisticians arrived on 14 August from the United States to supplement the small group of dedicated Americans.

On 16 August, while establishing his headquarters at Dhahran, where all US troops were arriving, Major General William G. Pagonis was appointed Commander, US Army Central Command (ARCENT)(Forward).[3] Two days later, ARCENT formally established the ARCENT SUPCOM (Provisional), although it had been in operation since 10 August, with Pagonis as commander. On 27 August, a general staff was formed, augmented by soldiers from ARCENT headquarters, as the SUPCOM began to take shape.[4]

By late August 1990, the mission of the SUPCOM was expanded and outlined as follows:

•Deploy and organize host nation support (HNS) to receive and move onward soldiers and Marines entering the theater. Provide for further development of the US–Saudi Arabia (SA) support infrastructure.

•Develop from zero base the ARCENT SUPCOM, using arriving US units and cadre with host nation elements. Mature to a combined US–SA support structure.

•Provide theaterwide logistics support for reception, onward movement and sustainment of US and combined forces.

After the receipt of XVIII Airborne Corps, the development of the HNS infrastructure and the development of the logistics base, the mission was further expanded to include the "receipt, forward movement and sustainment of all forces in Saudi Arabia." This mission remained in effect for the receipt of the VII Corps from Germany.

Receipt of XVIII Airborne Corps

Elements of the 82d Airborne Division first arrived at Dhahran on 9 August 1990. When they arrived, there was no logistic structure to support the troops, no transportation, no shelter from the 130-degree heat, no A-ration meal support, little water available, no available sanitary facilities and no postal support. The SUPCOM and 1st COSCOM worked feverishly to provide these items and did so in a remarkably short time. At the end of August, the mechanisms were in place to start providing basic necessities: shelter, food, water, transportation, sanitation and postal services.

A key element in providing support was the HNS structure and contracting effort. A HNS cell and civilian contractor liaison officer worked these problems continuously within the SUPCOM LOC. The LOC, coordinating with the Saudi Arabian government, was able to acquire and provide fresh fruit, bottled water, other foodstuffs, transportation and billeting. Additionally, temporary camps with shelters were allocated to the incoming troops. The 82d Airborne Division was first quartered at a Saudi Arabian air defense site and eventually occupied several camps in the surrounding area.

By 30 September 1990, there were approximately 72,000 XVIII Airborne Corps troops in theater, supported by the SUPCOM and 1st COSCOM. One month later, most elements of the corps had arrived, and the SUPCOM and 1st COSCOM were supporting approximately 97,000 troops. By this time, 1st COSCOM had established log base Pulaski and the SUPCOM established log base Bastogne to support the forward operation of XVIII Airborne Corps.

U.S. military vehicles at Ad Dammam

Receipt of VII Corps

On 8 November 1990, President George Bush decided to send an additional Army corps to Southwest Asia to support possible offensive operations to liberate Kuwait. The movement of the heavy armored corps from Germany placed additional strains on the logistics system. This was particularly evident at the port facilities. Not only were the SUPCOM and COSCOMs required to deploy another corps faster than the first, but this time, it was required to paint all of the forest green tanks arriving from Germany a sand color before their movement to the desert. This was a monumental task that had not been anticipated. By late November, a logistic infrastructure was in place to support the troops and to paint their equipment.

VII Corps vehicles and heavy equipment arrived at the ports of Ad Dammam and Al Jubayl during the following two and a half months. Because of limited billeting space, VII Corps troops were billeted initially in warehouses at the port of Ad Dammam and at a staging area near the port of Al Jubayl before they were moved to field locations. By the end of December 1990, the 22d Support Command, together with the 1st and 2d COSCOMs, had received over 221,000 troops in theater along with over 769,000 short tons of equipment. The equipment included more than 6,000 tracked combat vehicles and more than 59,000 wheeled vehicles. VII Corps had about 80 percent of its elements in theater on 17 January 1991.

Support Command Plans

The development of the theater logistic support plan was integral to the overall success of DESERT STORM, and this planning began when Bush decided to send VII Corps to the theater of operations. By the end of November 1990, the five-phased theater logistics concept had been established, and the SUPCOM had published logistic operation plans (OPLANs) 91–1 and 91–2 detailing the initial phases of the projected offensive. The commander briefed the concept to all officers and noncommissioned officers of the command at a logistics exercise conducted on 4 December 1990, to ensure that all leaders understood the concept of the operation. The briefing and plans provided a single mission on which all leaders of the command could focus their attention in the following months. Additionally, the commander briefed the first three phases to Secretary of Defense Richard B. Cheney and Chairman of the Joint Chiefs of Staff General Colin L. Powell on 27 December 1990. The following briefly describes the five-phased logistics support plan:

Phase Alpha: *preparation and prepositioning*. This phase involved the repositioning of SUPCOM units and stocks of supplies from the south (vicinity of Dhahran and Al Jubayl) to the north along main supply route (MSR) Dodge, while simultaneously receiving and moving VII Corps to its tactical assembly areas. Additionally, huge logistics bases were built during December 1990 along MSR Dodge, near King Khalid Military City (KKMC) and along MSR Sultan, just south of KKMC. These log bases were designated Alpha, Bravo and Delta and were to contain all classes of supply supporting the two Army corps and echelons above corps.

Finally, to provide better command and control over the long distances, the SUPCOM LOC was divided, with a forward LOC established at KKMC. The duties and responsibilities of the forward LOC were identical to those of the main LOC at Dhahran with the exception that only the latter was responsible for issuing formal orders. This phase began in late November and lasted until the start of hostilities on 17 January 1991.

Phase Bravo: *movement of the corps*. Both the XVIII Airborne Corps and VII Corps moved simultaneously from their tactical assembly areas to their attack positions, with the SUPCOM assisting by providing the heavy transportation assets necessary to move the corps over the several hundred-mile stretch of desert. The tracked vehicles were then carried by the corps on heavy equipment transporters (HETs) to their attack positions. Many of these HETs were foreign-made (East German, Czech, and so on) and were driven by foreign drivers.

Additionally, the 1st and 2d COSCOMs, with help from the SUPCOM, established two new log bases (Charlie and Echo) to support each corps when the offensive would commence. This phase, which coincided with the beginning of DESERT STORM and continued through January 1991, reflected a total team effort of the SUPCOM and countless subordinate units.

Phase Charlie: *the ground offensive*. This phase entailed the SUPCOM support and sustainment of the ground offensive into Iraq and Kuwait. The plan envi-

sioned transportation of all commodities of supply, especially fuel, ammunition, food and water. Additionally, the construction of new log bases deep inside Iraq was anticipated to sustain the offensive, had it become necessary. This phase commenced on order at the start of the ground offensive on 24 February 1991.

Phase Delta: defense of Kuwait. This included SUPCOM support of civil-military affairs efforts to restore facilities and services inside liberated Kuwait. It began during the ground offensive, once Kuwait City was liberated.

Phase Echo: redeployment. This phase involved SUPCOM support of redeployment (which was dubbed Operation DESERT FAREWELL). It envisioned that the SUPCOM would provide the theaterwide assets to redeploy all elements of ARCENT. SUPCOM OPLAN 91–4 was the detailed logistic plan for this operation.

The Enemy Situation

Prior to the start of hostilities, the enemy forces in the Kuwaiti Theater of Operation (KTO) included some 42 divisions (about 500,000 soldiers) arrayed in a prepared, in-depth defensive posture. ARCENT believed the enemy possessed the ability to transition to short-notice offensive operations. The confidence of the SUPCOM, however, was bolstered with the arrival of the VII Corps in theater. The primary SUPCOM concern prior to D-day (17 January 1991) was the possibility of preemptive Iraqi air strikes and terrorist activity. Once hostilities began, however, attention became focused on the possibility of Scud attacks against logistics facilities and on limited enemy ground attacks that could have disrupted supply movement on the MSRs.

Operational Highlights

Movement of the Two Army Corps to Attack Positions. The movement of the XVIII Airborne Corps and VII Corps to their attack positions began on 20 January 1991 and continued around the clock for two weeks. By 3 February 1991, both corps had closed in their attack positions. The XVIII Airborne Corps moved on both the northern and southern MSRs, while the VII Corps moved only on the northern route. The distances both corps had to travel were considerable: more than 500 miles for XVIII Airborne Corps and more than 330 miles for VII Corps.

The SUPCOM provided extensive support for this movement that involved transporting thousands of tracked vehicles and controlling the movement of tens of thousands of wheeled vehicles. For example, VII Corps alone had more than 7,000 tracked vehicles and more than 40,000 wheeled vehicles. The SUPCOM's 318th Movement Control Agency (MCA) coordinated this large movement by allocating blocks of time to each corps for movement on their designated MSRs. The 89th Military Police (MP) Brigade provided support through MP checkpoints positioned on all routes of movement. At the peak of this movement, 18 vehicles per minute passed a single point on the northern route.

For this massive movement, the SUPCOM projected the need to provide approximately 1,300 HETs, 450 lowboys and 2,200 flatbeds, or a total of almost

Military and civilian gasoline tankers fill fuel bladders in the desert.

4,000 heavy vehicles of all types. The SUPCOM acquired this large number of heavy equipment vehicles by using US assets and trucks provided by European countries, Egypt, and host nation assets. Many of the drivers were contracted civilians who came from South Korea, Pakistan, Bangladesh, Egypt and other Third World countries.

Pre-positioning of Supplies at Logistics Bases. The SUPCOM pre-positioned supplies to support the ground offensive simultaneously with the movement of the corps to their attack positions. This entailed setting up log bases Charlie and Echo. The establishment of Charlie, however, to be located in the northwestern portion of Saudi Arabia, could not begin until the start of the air campaign. This was because a large-scale movement of troops to the west prior to this time could have alerted the Iraqis and caused them to shift their forces directly onto the path of one of the allies' axes of advance. Log base Charlie provided support to XVIII Airborne Corps and Echo supported VII Corps. The supplies for these log bases were transported along the southern MSRs.

Critical to the success of the ground offensive was the sufficient theater stockage of Class I (food and water), Class III (fuel) and Class V (ammunition) supplies. By G-day (24 February 1991), there were approximately 29 days of supply (DOS) of Class I, 5.2 DOS of Class III and 45 DOS of Class V (although many of the preferred Class V items were stocked at over 100 percent required). By the cease-fire on 28 February 1991, there were 25 DOS of Class I, 5.6 DOS of Class

III and about 66 DOS of Class V (based on consumption rates during the 100-hour ground war).

Daily support requirements for the corps were computed as follows:

•Ammunition Resupply: VII Corps—450 truckloads/9,000 tons; XVIII Airborne Corps—400 truckloads/5,000 tons.

•Fuel Resupply: VII Corps—400 truckloads/2.4 million gallons; XVIII Airborne Corps—480 truckloads/2.1 million gallons.

The significance of these requirements was the realization that the projected consumption rates and long lines of communication would result in an expenditure of supplies faster than the primary log bases could replenish. Accordingly, two contingency plans were developed. The first was to reduce the lines of communication by constructing roads following the two attacking corps, and the second was logistics over the shore operations if a port in Kuwait could be made available.

Support and Sustainment of the Ground Offensive. The SUPCOM planned to support the ground offensive, using the "90-mile rule," which allowed drivers to make a round trip in a 24-hour period. SUPCOM provided critical Class I, III and V assets 90 miles forward into Iraq from log bases Charlie and Echo to provisional log bases that would have been set up, if necessary, to sustain the offensive. Because the ground offensive penetrated so deeply into enemy territory and because of its short duration, these provisional log bases were never fully set up. Instead, they became trailer transfer points where SUPCOM trailers were dropped for corps units to take farther forward. Had an extended resupply capability been necessary, the SUPCOM would have been prepared to meet that requirement.

Observations

The SUPCOM used doctrine whenever possible, but always tailored doctrine to meet the needs of the situation. In general, the most important area where doctrine helped was in providing guidance and standardization. Standardization was one of the reasons the SUPCOM was successful in logistically supporting an operation of this magnitude. However, the SUPCOM used standardized procedures and operations in a manner that did not stifle the initiative, drive and innovation of its subordinate commanders and soldiers. Under the harsh conditions of improvisation prevalent in August and September 1990, it was extremely important to solve problems and alleviate shortcomings in a timely manner. If some unorthodox or different technique worked, it was used immediately. Doctrine was not allowed to stand in the way of the prompt and complete logistic support of the soldiers in the Southwest Asia theater of operations.

Another major achievement of the SUPCOM was the smooth integration of Reserve Component (RC) elements into the overall logistics structure. About 20 years ago, the Army's force structure was reorganized so that most of the combat service support (CSS) elements are in the RC. This permitted the soldiers in these units, many of whom perform the same military duties as they do in their civilian careers, to be mobilized and deployed without delay to Southwest Asia, where they carried out their duties in a remarkably effective manner. The earlier

decision proved to be correct and valuable, as no time was wasted, after mobilization, retraining these citizen-soldiers to accomplish their individual tasks and unit missions. The payoff was that many RC soldiers drew individual and unit equipment and were performing their missions in the field within 48 hours of arriving in country.

In addition, since many of the RC elements are CSS units, eventually 75 percent of the strength of the SUPCOM, which peaked at 40,898 soldiers, was RC soldiers. The RC units conducted continuous operations in all areas of logistic support. The contributions of RC units were vital to the successful accomplishment of DESERT STORM.

There must be, however, a proper ratio between CSS elements in the RC and in the Active Component. In the event of a military deployment to a hostile or potentially hostile theater of operations, elements such as the movement control center and MCA must be immediately deployable, or valuable time will be lost and confusion may result.

It is not the intent of this article to chronicle and assess the "lessons learned" from the logistic standpoint of DESERT STORM. There were numerous shortfalls in doctrine that were overcome by superhuman efforts, initiative and tenacity. No one must lose sight of the tremendous civilian logistics infrastructure in country, which made up many shortcomings. All logistic activities, successes as well as shortfalls, have been fully documented and are currently being studied to ensure that logistic support of the next military operation is even better than it was for DESERT STORM.

The success of theater logistic support operations in Southwest Asia during DESERT STORM was the direct result of effective centralized planning by the SUPCOM and audacious decentralized execution by the logisticians in the combat units, the forward support battalions, and the division and corps support commands. It was also the culmination of intense effort and farsighted planning conducted during DESERT SHIELD. There were many other unsung logistics heroes, military and civilian, in these operations, in addition to the direct participants. They include those in Headquarters, Department of the Army, FORSCOM, Army Materiel Command, US Transportation Command, Military Traffic Management Command, Military Sealift Command, Military Airlift Command, Defense Logistics Agency, US Army, Europe, Eighth US Army and a host of others, including the indispensable support of the American people. In short, it was a joint, multiechelon, Total Force effort, proving beyond a doubt that "Good Logistics is Combat Power."

Notes

[1] This article, of necessity, concentrates on the logistic aspects and support of Army units during Operation DESERT STORM. The omission of US Air Force, Navy, Marine Corps, Coast Guard and allied operations is not meant to denigrate their invaluable contributions to the overall success of this campaign.

[2] Much of this article is derived from memoranda, situation reports, daily command briefing slides and other documents of Headquarters, 22d Support Command, including: Memorandum, 23 March 1991, Subject: Command Report, Operation Desert Shield, 22d Support Command; Memorandum, 28 March 1991, Subject: Summary of External Logistics After Action Review (AAR) (ARCENT, XVIII and VII corps); Memorandum, 3 April 1991, Subject: Summary of MSC After Action Review; Memorandum, 5 April 1991, Subject: Command Report, 22d Support Command, Operation Desert Storm, 17 January–15 March 1991; Memorandum, 30 May 1991, Subject: Written After Action Report, Desert Shield/Desert Storm; and Memorandum, 24 June 1991, Subject: Draft-Logistical History of Operation Desert Shield/Desert Storm. Principal authors, among others, of these memoranda include LTC Russell A. Eno, LTC Wesley V. Manning, MAJ William W. Epley, 1LT Frank Behan and SGT Howard Miller. COL James Ireland also provided superb guidance and technical advice as this article was being written.

[3] The ARCENT main headquarters remained in Riyadh, the capital of Saudi Arabia.

[4] The Headquarters and Headquarters Company, 22d Support Command, was constituted 21 August 1965 in the Regular Army as Headquarters, Headquarters Company and Special Troops, 22d Field Army Support Command and activated that same day at Fort Lee, Virginia. It was inactivated 7 December 1970. It was redesignated 16 December 1990 as Headquarters and Headquarters Company, 22d Support Command, and activated at Fort McPherson, Georgia. The headquarters and command's colors were then transferred to Dhahran, Saudi Arabia, the following day.

EPILOGUE

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The "Tooth-to-Tail" Ratio

Introduction. Col. John M. Vann takes up one of the abiding themes in the history of U.S. Army logistics, the "tooth-to-tail" ratio. He notes that combat service support forces have never been adequate to the size of the combat forces they had to support, and he argues that the situation has become worse rather than better in the last two decades. His argument for an adequate logistical support force structure also constitutes a review of key issues and decisions in the field of Army logistics since the Korean War, and thus brings up to date and summarizes many of the themes addressed in this anthology.

The US Army's thin line of logistic forces behind its combat divisions has been the topic of much discussion but limited action within the Department of Defense (DOD) for several years. Despite continuing protests from the field over major shortfalls in these unglamorous but critical forces that provide lifeblood to our major fighting units, the problems persist. Our protracted failure to provide these forces stems from three fundamental flaws: unclear responsibility for solving the problems, the way we plan and a general lack of understanding of logistics. The result has been an extended period of now institutionalized neglect that we cannot quickly fix. Unwillingness to admit shortcomings and to solicit broad governmental support for overcoming them could have tragic consequences on the next battlefield if our tanks and helicopters have no ammunition, no fuel and no spare parts.

The most important evaluation of Army logistic forces is that of the theater commanders in chief (CINCs) charged with the daily reality of being prepared to use those logistics forces to fight a war. General Bernard Rogers, former Supreme Allied Commander, Europe and US Army Chief of Staff, told the US Senate Armed Services Committee in December 1985 that "we don't have sufficient combat service support forces to support our forward deployed forces in Europe."[1] He has reemphasized his evaluation several times since, and Marine General George B. Crist, the commander of our rapid response forces for the Middle East, echoed his views in March 1986 testimony to Congress.[2] Commanders of other unified

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commands and many of the Army's field commanders are concerned about the low readiness and inadequate number of nondivisional logistic support units needed immediately to begin fighting a war.

Former Assistant Secretary of Defense James Webb, who until April 1987 oversaw DOD's Reserve Components, upon which the Army depends for more than 70 percent of its logistic support forces, has similar views. He has said that placing more combat troops in Europe in the last decade has caused such a force structure dislocation that combat units now do not have sufficient logistic units to sustain them in a conventional war. He believes that our tail-to-tooth imbalance has caused "operational paralysis, forced down the throat of the commanding general who would be required to fight a European war."[3]

The widespread deficiencies run the gamut from an inadequate number of support units to major problems in manning, equipping and training both active and reserve units. These deficiencies result from not placing sufficient priority on the support forces we need most.

One indication of where the priority has gone is the marked increase in combat units during the past quarter century when available manpower was actually shrinking. Historical DOD data show this disproportionate growth of combat battalions and divisions since 1962 as the Army's total manpower (active, reserve and civilian) declined following the Vietnam conflict and remained significantly below prewar levels.[4] Currently, we have 367 maneuver battalions in the active Army, as many as in 1968 at the peak of the Vietnam conflict—142 more maneuver battalions than in 1962—but we have nearly a quarter of a million fewer soldiers on active duty.[5]

DOD manning statistics confirm the trend. Within a near-constant active end strength since 1974, active combat units actually increased manning by about 80,000 soldiers, mostly at the expense of active support units, which decreased by nearly 40,000 soldiers.[6] The trend doesn't change much by adding reserves. According to Army data, nine of every ten soldiers the Army added to its tactical forces since 1974 were assigned to combat units.[7]

The logistic forces in jeopardy are non-divisional combat service support (CSS) forces that provide corps, army and theater support. They do not include peacetime base operations organizations that people sometimes confuse with the units responsible for in-theater tactical support in wartime. The wartime tactical logistic units that are in trouble perform the primary functions of supply, maintenance, transportation, traffic control, medical support, construction and selected other administrative and technical service functions, such as graves registration, decontamination, laundry/bath service or civil affairs support. People sometimes refer to them as the Tactical Support Increment (TSI) of the Army force structure. Some logistic units are also integral to divisions, but the Army's logistic force problems are not in divisions.

Skeptics may wonder, however, why, if the problems are so serious, more has not been done to solve them. The reasons have evolved over the past 25 years through a complex series of events ranging from congressional tinkering with meaningless tooth-to-tail ratios in the mid-1970s to support force reductions initi-

ated by over-zealous critics within the Pentagon who equated combat capability to the number of tanks they could count. Viewed alone, these events may not raise undue concern. But pieced together, they form the discomforting mosaic facing CINCs when they try to build realistic conventional war plans and try to avoid unnecessary risk of nuclear escalation. Their combined effect has been a piecemeal dismantling of our technical support capability, for which no single person was responsible. Today, no single person is yet responsible for correcting it either.

Responsibility for support forces began to cloud in the late 1950s when the Army, following its experiment with the pentomic division and presaging a DOD-wide trend, began to rearrange support at division level along functional instead of branch lines. This change culminated in approval in 1961 of the ROAD (Reorganization Objectives Army Division) concept.

Before ROAD, units of the Technical Services in a division had a clear relationship with their parent branch. They worked under technical supervision—a term loosely interpreted to mean absolute control—of the senior Technical Service officer in the division as part of stovepipe organizations under overall control of chiefs of Technical Services in Washington. Quartermaster units, for example, were the responsibility of the Quartermaster General.

In the new ROAD division, Technical Service units lost branch identity as technical functions merged. The Army consolidated quartermaster units, for example, with maintenance, transportation and other units and made them part of new division support commands commanded by officers with no direct affiliation with Technical Services. This reorganization was the first in a series that ruptured historical, traditional association units and personnel from their parent Technical Service. During that same year, DOD created the giant agencies: Defense Supply Agency, Defense Intelligence Agency, Defense Communications Agency and so forth. They also aligned functionally, absorbing selected duties and much manpower from the Technical Services. But the defense giants focused—as they still do—on single-manager, commodity management of hardware rather than on integration of hardware with personnel, training and doctrine.

In addition, the vast majority of employees of the new defense agencies were civilians. Thus, familiarity with and understanding of Army tactical support units that had characterized Technical Services disappeared. And the moves to functionalize both above Army level and within the Army thus left Technical Services with no clear link to their DOD support counterparts or, at the operating end, with the division.

Then, in 1962, came the pivotal decision to eliminate Technical Service chiefs as part of Army reorganization. That decision culminated an effort to reduce the power of and to trim the fat from Technical Services, whose authority and relative autonomy had caused Army-wide resentment since World War II. From the perspective of those outside the Technical Services, Technical Services could no longer by-pass the General Staff.

On the other hand, loss of Technical Service chiefs removed the primary spokesmen for Army support forces from senior circles of power in Washington. No longer did the senior Quartermaster officer, for example, provide concepts and

doctrine for Quartermaster Corps operations and develop and defend needs for manpower, money and units. No longer was he even in Washington. And no longer did he or other Technical Service chiefs have easy access to the Army Secretariat and senior decision-makers affecting the Army's future.

Elimination of Chiefs of Technical Services and reorganization along functional lines accelerated the demise of the Technical Services, completed orphaning of Army support units and blurred responsibility for their adequacy. Previously, the Technical Service chiefs had been responsible for two main tasks: providing branch units to operate under interbranch commands and branch staff sections to supervise their operations; and commanding directly the branch support base for the entire Army, such as schools, base maintenance shops, depots and procurement organizations.

After 1962, the mission focus was gone, and a hiatus in responsibility for branch units and doctrine occurred as dismantling of the Technical Services began. In a sense, technical branches became nearly irrelevant, as units formerly performing branch-related technical missions merged into new units without branch names. Under the new system, the entire personnel management structure for technical specialties was left in a quandary. Although clearly infantry and armor officers would command infantry and armor units, for example, which branch would provide the commander of a support command or a forward support battalion? The Army is still grappling for ways to compensate for this disruption of long established patterns of support branch missions, activities and functions.

With the principal logistic spokesmen silenced and responsibility for logistic units fragmented, the subsequent increase in combat forces at the expense of support became almost inevitable. Such a trend appealed to all the major Washington constituencies, none of whom had a vested interest in the adequacy of company-size support units from the Technical Services. Army Chiefs of Staff, selected from the ranks of the combat arms and unschooled in technical branch operations, naturally wanted more combat units. So did politicians, who preferred not small logistic units but large active-duty combat divisions that would stimulate local economies and bring additional jobs to their districts.

With Technical Services out of decision making, no one had the requisite combination of interest, understanding and influence to restrain the headlong rush in the 1970s to "heavy" the force to match Soviet conventional improvements. Shortsighted defense analysts, intent on counting tanks and playing Patton-like war games of attrition used the amorphous mass of support as fair game to provide additional manpower spaces for new tank battalions that Lanchestrian attrition models told them the Army needed to fight in Europe. With analysis based more on emotion than fact and with both feet planted firmly in the stratosphere, the Pentagon and Congress jointly painted the CINCs into the corner they now occupy. They pushed logistic forces into the Reserve Components, using the guise of the Total Force Concept as a politically popular slogan to hide lack of total force analysis. They removed literally hundreds of logistic missions—and capabilities—from active forces. According to Webb, this move made the Army depend on Reserves for logistic support of any sizable regional conflict.[8] Consequently, sup-

port of the Active Army is now designed basically to handle only peacetime workloads—while relying heavily even in peacetime on contractors, civilians and "manageable" maintenance backlogs.

Finally, in the late 1970s and 1980s, budgetary pressures, the Strategic Defense Initiative and the 600-ship Navy left the Army unable to achieve its ambitious plans to rely on Reserves under the Total Force concept and resulted in the effective removal of a large number of support units from the force by simply not forming needed additional support units. This portion of the "forgotten" forces now exists only on paper through a unique accounting mechanism called COMPO 4—the unresourced component of the force. There the "paper tail" languishes, with neither people nor equipment and with an American public and Congress unaware of the potential dangers posed by what believers in the status quo simply call an acceptable increased risk. It remains much easier to join the steady drumbeat of outdated criticism about fat in the Army's support tail than to address the problem and suggest that phantom units have placed us, as Webb says, "in danger of having a force structure that is not even as sustainable as the beans, bullets and bandages that we have in place to support it."[9]

The question of just which office is responsible for support forces remains unanswered. No element in either the Office of the Secretary of Defense (OSD) or in Office of the Joint Chiefs of Staff (OJCS) has clear responsibility for ensuring that forces we build are supportable. As a result, no one critically examines our logistic force needs before making key decisions to build air wings, combat divisions and aircraft carriers. For example, the Army did not know the logistical effect of adding two new light infantry divisions to its active structure until nearly a year after it announced its decision to add them. At the time, the logistics communities in OSD and OJCS viewed logistics as dealing with materiel, not forces. Force structure communities looked only at combat force structure and considered logistic force structure a matter for logisticians. No one wanted to evaluate below-the-line support forces. By the time the effect of the decision became apparent, it was too late to reverse a politically popular but potentially disastrous choice.[10]

Planning

Serious flaws in the DOD planning system are the secondary fundamental reason for persistent problems in Army tactical support forces. The planning flaws had their roots in changes that began in 1962, when Robert McNamara, then Secretary of Defense, instituted the complex Planning, Programming and Budgeting System. Instead of a single coordinated system, DOD operates three independent systems: one for strategic planning, one for constructing war plans and one for resource planning. In theory, the systems mesh. In practice, however, they are nearly mutually exclusive and create serious disconnects because no unifying thread integrates different views of the planners. Each planning system focuses on a different set of problems at a different point.

The strategic planners in the OJCS use the Joint Strategic Planning System, and they focus about ten years into the future. They base their planning on a

Panglossian vision of the future unconstrained by reality—guided by what they would like to have in an ideal world to protect national security, with full knowledge that the forces are unaffordable. But they ignore logistic forces in their strategic planning, forgetting that logistics is the true limitation on a realistic strategy. The OJCS strategic planners concentrate instead only on major above-the-line forces (divisions, wings, carrier task force groups). By excluding an evaluation of supportability of the force, they build flaws into our strategic planning that resemble management plans to build a football team by focusing only on the quarterback and receivers and ignoring the offensive line and blocking back.

Those who build war plans and who know best what our most pressing warfighting needs are, however, use a different system, called the Joint Operation Planning System (JOPS). Under that system, CINCs build realistic plans based on what the OJCS has told them is available. Only then do they evaluate what they can do with expected assets and therefore know what they need most. One might expect that their knowledge of today's shortfalls would then become the foundation for what DOD buys in the future to eliminate capability deficits. Instead, because of a fear of compromise of war plan details, this information lies fallow in the Joint Staff, protected by a shopworn administrative regulation known as "MOP 39". Many officers have not even read this document, but they often cite it as an excuse to avoid penetrating external analysis or to avoid divulging to OSD what needs to be fixed.

The OSD is responsible for operating the third system, the PPBS resource planning and allocation process. But because the only information about strategy, forces and priorities that OSD receives from the OJCS as a basis for planning is the unrealistic, unconstrained view of strategy developed by the strategic planners, OSD has no realistic basis for developing a menu of resource allocation choices.

Lacking useful OJCS advice about what needs to be fixed, OSD must use an artificial means to establish planning and programming priorities for services. This artificial scenario, known as the Defense Guidance Illustrative Planning Scenario, assumes an extremely important role, because it then becomes the means by which OSD and the services estimate requirements and program dollars. But the single artificial global scenario and its related force planning projections ten years into the future are essentially the same used by OJCS strategic planners and are very different from theater-unique scenarios CINCs and OJCS operational planners use to build war plans. Thus, we have no common basis for reconciling differing estimates of need. By assuming simplistically and incorrectly that, if we can handle one large war, we are capable of responding to more than one (or even one) lesser included wars, the artificial OSD scenario simply adds to planning confusion.

The principal effect of using an unachievable scenario and set of assumptions in both strategic and resource planning is that it gives the services latitude to plan and fund any programs they choose and still remain within broad OSD planning and programming guidelines regardless of the real effect on individual CINC theater war plans. Thus, the Army can add more divisions instead of support forces and claim that it is getting closer to an unachievable goal, and who could argue against that?

The operational result is that CINCs now have the consequences of 25 years of myopia in force building: an Army with teeth but no jawbone and, hence, little conventional deterrent credibility. The additional divisions carved from a shrinking force since 1962 at the expense of support units may have replaced a "hollow Army" with a "hollow deterrence."

Understanding

A general lack of understanding of logistics is also responsible for failure to provide the forces the CINCs need. Today's leaders may find some lessons in the words of General Omar Bradley describing General George Patton as one who was oddly indifferent to problems of supply and who, though a skilled tactician, had little patience and "shunted supply brusquely aside as too unworthy a detail to merit his attention."[11] The point is not so much that Patton did not appreciate logistics as it is that we may need more Bradleys in our senior ranks who are willing to acknowledge and take action when needed on details of logistics.

Most senior officers are neither schooled nor experienced in theater logistics. In 1986, for example, of 11 Army four-star generals on active duty, all had served in divisions. But only one had ever served in a nondivisional logistical unit, although support units make up nearly half of the Army's wartime forces. Only five generals had had a logistics assignment of any type, and none had been assigned to advise the Reserves that provide most Army support forces. With the World War II generation and nearly all Korean War senior officers now gone from active duty, we simply do not have any officers who have experienced theater logistical operations in an unstable, hostile base environment.

The lack of emphasis on theater logistics at staff and war colleges reflects this lack of logistics experience among senior officers. Although few Army officers will ever be involved in tactical maneuvers of combat forces, the curriculum in these schools deals mostly with handling combat forces. War games usually note logistic force constraints but assume them away so they do not interfere with maneuver.

Army schools also give logistical lessons of history short shrift while tactical lessons of major battles receive a great deal of attention. US history provides some key lessons about the effects of logistics that serious students of warfare should evaluate carefully. Our experiences in the four major conflicts of this century, for example, provide three general lessons.

First, in all four conflicts, we underestimated in peacetime planning the amount of wartime support our forces would need. In World War I, 12 of 42 US divisions deployed to Europe had to convert to support functions because the War Department had provided insufficient support to keep divisions in action.[12] In World War II, the number of divisions planned continually shrank from 114 in 1942 to 100 in 1943 to 90 in 1944, and nondivisional combat units decreased correspondingly for similar reasons.[13] During the Korean conflict, shortage of support forces, particularly truck companies, again hampered progress of combat forces. Even more damaging was our failure to provide trained US supervisory support

personnel conversant in Korean and Japanese who could coordinate host nation assistance.[14] Vietnam reflected the same problems, particularly in base development. In all four cases, the first key logistic lesson is that we have a consistent history of underestimating wartime logistic needs.

The second and corollary major lesson is that, because of a propensity to underestimate support needs, we have had inadequate support force structure in existence at the beginning of each conflict.[15] Fortunately, the pace of previous wars and advantages of a reasonably secure homeland and lines of communication allowed time to overcome these deficiencies. We will, however, hardly have the luxury of long warm-up periods to correct planning mistakes in preparing for future conventional conflict.

Third, tactical support needed in each 20th century war has progressively increased for many reasons.[16] The most apparent reason is a vastly increased support workload on logistic units. As forces became more technologically oriented, they needed more supply, maintenance and transportation for weapons and equipment that were bigger, heavier, more complex and more numerous and for forces that had to move more quickly over greater distances. Ten times as many vehicles per man were in theater in Vietnam as in Europe in World War I.[17] We have transitioned from supporting horses using hay appropriated from nearby fields to supporting increasingly complex tanks and helicopters with gargantuan appetites for fuel, ammunition and spare parts. An M1 Abrams tank, for example, consumes three times as much fuel in European combat conditions as an M60A1.[18] Shifting existing large stocks of older equipment to the Reserves rather than replacing them has increased the number of tanks and other new equipment that need support.

The complexity of supplying and maintaining the Army's big, new high-tech equipment means that we need more highly skilled soldiers who take longer to train. Training an avionics mechanic for a Blackhawk helicopter, for example, takes about 35 weeks.[19] In the past, several weeks of training were adequate for young soldiers with mechanical skills already learned from repairing their own cars. We now must supplement these skills with additional training on black boxes and the mysteries of computer technology.

And although Army emphasis on component replacement rather than component repair has probably simplified work for maintenance personnel in divisions (already staffed at 100 percent), the price for speedier initial return to operation of weapon systems in forward areas may well be increased workload in rear areas—where Army logistic units are weakest. The "fix forward" doctrine, while appealing to division commanders because it pushes work out of divisions, may not be able to provide them the responsive "refills" they need. Indeed, despite recent emphasis on reliability and maintainability, it could well be that the net logistic workload has still increased and that the rearrangement has simply placed the burden on units least capable of shouldering it.

The Army also must now keep a larger number and wider variety of repair parts and components on hand and transport them over greater distances. It uses, for example, 20 percent more line items now than in 1970.[20] Even AirLand Battle doctrine signals the need for more logistic support, because it includes more

maneuver over greater distances. This increase translates into a higher demand on our support units, although the Army has little idea how much, because it accepted the new doctrine without evaluating the logistic effects.

At the same time, defense commitments have expanded into areas that will increase the need for logistic force structure. In Europe, US forces have long counted on significant local support from the highly developed economy. But Middle Eastern deserts and tropical regions of Central America, for example, have few if any logistic bases or lines of communication for potential local support.

Despite how simple these trends and logistic lessons seem, the majority of the US officer corps has not absorbed them. Our recent experience in Grenada—a reasonably simple, logistic task—provided a small foretaste of what we could expect if the Army had to provide logistical support on a large scale in a hostile environment. The OJCS logistic planners did not even know about the Grenada operation until after it had begun. Planning also omitted graves registration personnel. Teams to order resupply items could not communicate with the continental United States (CONUS) sources of supply because they had inadequate communications equipment. Rations shipped to the island to feed US soldiers went to feed prisoners. Fortunately, our soldiers were able to appropriate enemy trucks and borrow needed food, water and fuel.[21]

But did we need Grenada to sound a warning when studies of Army logistic forces over the past ten years had provided increasingly ominous indications of inadequate priority to logistic forces? The prospects for change are uncertain. Despite the fact that many senior policymakers both in and out of uniform oppose the direction the Army has charted, many officers believe the Army is committed to current structure and priorities regardless of consequences for the rest of the force.

Proponents of current Army structure and plans believe that only combat forces deter. They argue that the Soviets are impressed primarily by large numbers of divisions, and they discount estimates of Soviet sophistication in evaluating our total force capability, including our support weaknesses. They also seem to discount the possibility that Soviet awareness of our logistic weaknesses may be a principal reason for suspected Soviet war plans to outflank US forces in Germany, get to the rear quickly and cut off our divisions from their tenuous lines of communication.

The argument for a large number of divisions as a deterrent also seems to anticipate a short conventional war in Europe, where extensive lines of communication for sustained combat would, of course, not be necessary. Such reasoning is both shallow and dangerous. It relegates US soldiers to a tripwire role and invites reliance on early escalation. If we are not going to plan on sustained conventional combat, we do not need large numbers of "tripwire" divisions.

Another argument is that the Army, because it must prepare for a broad spectrum of conflict, has designed a balanced force that provides some capability against all possibilities. If one measures balance by an equal number of light and heavy forces, that idea may be true. About half of DOD's land forces are light and half are heavy. If, on the other hand, one measures balance by our conventional

capability to respond to the greatest threat, the answer may be very different because Soviet forces are 96 percent heavy.[22]

Whichever view of balance is correct, planned Army structure and priorities clearly please few CINCs. General Paul F. Gorman, former commander of Southern Command, an area including Central America, disagrees strongly with current plans. In 1986, he told a gathering at the Brookings Institution that Army light divisions were inappropriate for low-intensity conflict and that any attempt to use them would invite military disaster. He also said that he would rather have four more engineer battalions than four light divisions and that the Army needed combat service support far more urgently than shooters.[23]

An additional justification often heard in defense of the status quo is that solutions will come in the Five-Year Defense Plan through a series of "new initiatives" if we just wait long enough. But solutions to support problems—if, indeed, such solutions exist—often appear only in the last year of the plan with other low-priority projects, where they go on hold perpetually as promised future funding fails to materialize.[24] The Army's initiatives are not new and may well be inadequate. Known in Pentagonese as "risk reduction" measures, Army palliatives for logistic force deficiencies have changed little in several years.

Some people expect the most visible and encouraging improvements to come from logistic unit productivity studies (LUPS). Designed to reduce requirements and save scarce support manpower by using more productive equipment, LUPS changes began in the early 1980s under supervision of the Office of the Deputy Chief of Staff for Logistics. One such change was replacing 5,000-gallon fuel tankers with 7,500-gallon tankers, theoretically saving a driver for every three older vehicles while retaining ability to carry 15,000 gallons of fuel. But the program apparently failed to account for increased fuel consumption as the Army modernized and to consult field troops overseas on the practicality of the changes. What seemed logical to planners thinking about line haul on US four-lane highways did not necessarily meet the needs of European logistic planners concerned about ability of larger, longer tankers to negotiate narrow German roads off autobahns. As LUPS factors in similar field experience, initial estimates of saving 30,000 manpower spaces[25] may prove to have been very optimistic.

Unfortunately, it may be too late to recoup the spaces. In force structure planning, credit appears years ahead for anticipated manpower savings. Logisticians had hoped to reapply manpower savings to alleviate long-standing manning shortfalls in existing support units and to create new units; however, the Army may have used these manpower savings instead for combat units that the Army decided in 1983 it needed more than it needed support units. LUPS savings may not, therefore, provide relief expected by field commanders.

As with LUPS, contributions of US allies under host nation support (HNS) arrangements will continue to help, but by no stretch of the imagination will solve the Army's support force dilemma. The Federal Republic of Germany agreed several years ago to provide eventually about 50,000 reservists to support the Army in Europe.[26] Most observers of defense affairs assumed this number represented a new addition to our capabilities. In fact, however, some of the

promised support has been in existence and factored into US plans for decades. German Civilian Support Groups have been a key, stable part of logistic support to US forces since the 1940s. The only change in their contribution to our forces is that the armed forces are now integrating them as reserves with a wartime role, rather than as civilians.

The same situation exists in Korea, where KATUSA (Korean Augmentation to the United States Army) soldiers have helped US forces in both combat and support rules since the Korean conflict. And since the 1950s, the Korean Service Corps (KSC) has performed technical and service tasks, particularly labor-intensive jobs requiring less training. But although host nations can help quite a bit, what they can and should contribute has a limit. The sizable host nation support contribution to logistic operations from the Western European civilian economy and infrastructure that could assist US divisions would not likely be available elsewhere in the world.

Indeed, we may have good reason to question a DOD policy that presses for increased reliance on other nations for logistic support and that has encouraged replacement of US logistic structure based solely on expectations of signed agreements. Logic would seem to be on the side of a US policy that first defines a minimum level of unilateral US capability that we should maintain as insurance against changing circumstances in our alliances, then seeks foreign assistance when logistic support may be feasible and finally replaces US force structure only when host nation capability has proved itself adequate. Instead, we do not begin by defining a minimum US capability.

The Army erases need for US logistic structure once a host nation signs an agreement. One cannot help wondering just how dependent our combat forces really are on other nations for critical logistic support. Wartime host nation agreements, according to Rogers, "will not be a panacea for all of the combat support/combat service support units."[27]

LOGCAP (Logistics Civil Augmentation Program) is another risk reduction initiative that the Army began three years ago. The program uses contingency contracts with civilian groups or corporations to provide wartime capabilities, such as tugboat service, that either do not exist in the US force structure or that contractors could provide more quickly or economically. Although LOGCAP does have some potential, it may be limited. According to Pentagon sources, the program has accomplished little and has encountered skepticism among potential field users who will need manpower to administer the contracts. They harbor doubts about relying extensively on contractors for critical wartime support and have not yet seen LOGCAP's potential demonstrated.

Another improvement frequently cited by Army spokesmen as a risk reduction measure is the continuing "scrub" of support requirements. Those who do not understand logistics have succeeded for years, based more on emotion than on evidence, in painting support forces' needs as overstated. By so doing, they have won approval for a succession of studies to reverify repeatedly "real" need to reduce logistic forces to bona fide "hard" requirements. Although studies, historical indicators and testimony of US commanders, however, have consistently pointed to the

conclusion that we simply did not have enough support units for the Army's divisions, the tactic of continually studying the problem has been largely successful. Studies delay action long enough to avoid change while different assumptions and scenarios, and different interpretations of results, create uncertainty in minds of civilian decision makers.

How much are we short? What is the condition of existing logistic units? The details are classified. But US commanders who say Army initiatives have not provided the logistic capability they need describe the problem as serious. Crist said to Senator Nunn in 1986 testimony, "Overall, there is a 35,000 (man) shortfall for Southwest Asia in reserve units right now."[28] If the shortfall in support for 4.5 of the Army's 28 divisions is that large, other CINCs have good reason to be concerned about supporting the other 23.5 divisions relying upon the Army's forgotten forces.

The time is ripe for change. Congress and the Packard Commission specifically recognized such long-standing concerns of US commanders when they agreed in 1986 that the roles of the CINCs and the Chairman of the Joint Chiefs of Staff needed strengthening to force attention to their needs. The Department of Defense Reorganization Act of 1986 has removed some major organizational impediments to change, and the locus of power is rightfully shifting from services to commanders. DOD has a rare opportunity to begin solving a fundamental problem of CINCs.

The first and most important action that the Secretary of Defense should take is to make an OSD assistant secretary unmistakably responsible for logistic forces. The chairman should likewise pinpoint responsibility at a commensurate level in OJCS.

By fixing responsibility at senior levels, the likelihood of solutions will increase significantly as those who are responsible can highlight logistic force issues to decision makers in Washington with adequate interest, authority and influence to cause change. Appropriate top management interest could usher in needed regular, high-level review of readiness of logistic forces, for example. Readiness reviews throughout the Army and DOD, like force planning, tend to focus on divisions and pay little attention to the hundreds of nondivisional supply, maintenance, transportation, medical, engineer and other logistic units. More top-level scrutiny of logistic force problems would also mean that DOD would have to pay closer attention and accord higher priority to Army Reserves, because they provide the bulk of Army wartime logistic units. The current Army policy of manning and equipping all 28 Army divisions at nearly 100 percent, including late deployers, while reserve logistic units deploying well before many of these divisions are ill equipped and manned with trained personnel at an average of 80 percent fill,[29] is not likely to provide the responsive support commanders say they now lack.

Settling the issue of responsibility for logistic forces will also promote a greater understanding of logistics and eventually draw attention to solutions to other problems. It would in all likelihood lead to further discussion of the Army's need for more money to solve its logistic force problems. But pinpointing respon-

sibility and giving the Army more money will not solve logistic force problems without one other fundamental change. We need to integrate, rather than separate, the planning systems described earlier and revise them so that they can fix flaws identified in a net assessment of our current, rather than some ideal future capability. This approach is entirely consistent with Packard Commission recommendations on National Security Planning and Budgeting.

With necessary repairs to our planning systems, and with responsibilities clearly assigned at senior levels for fixing Army logistic forces, the lack of understanding of logistical problems that seems so pervasive and intractable would eventually be resolved. The multitude of specific actions needed to reverse decades of benign neglect would follow naturally.

More studies of the situation will not change the judgment of our CINCs about the support forces that are now their Achilles heel. If DOD does not take advantage of the current opportunity to blend a solution to this long-standing problem into the reorganization now beginning, the problems the CINCs experience due to logistic force shortfalls could, for the first time, be a principal cause of our soldiers dying. According to General Glenn K. Otis, commander of US Army Europe, "daring tells us that we may disregard CSS in select cases, but history warns that there is peril in basing combat operations on inadequate CSS. We here in USAREUR believe the warning of history."[30]

Notes

[1] General Bernard W. Rogers, Commander in Chief, US European Command, Hearings before the Senate Armed Services Committee on the Organization and Decision-Making Procedures of the Department of Defense and the Congress, 12 December 1985.

[2] General George B. Crist, USMC, Commander in Chief, US Central Command, "Hearings before the Senate Armed Services Committee on Department of Defense Authorization for Appropriations for Fiscal Year 1987, " pt. 2, Unified Commands, 11 March 1986, 617.

[3] James H. Webb Jr., "Military Competence," *Defense Issues*, 1, no. 61 (28 August 1986): 5.

[4] US Department of Defense, Five-Year Defense Program (Historical), prepared by Office of Assistant Secretary of Defense (Comptroller) (Program and Budget) (Washington, DC: 21 January 1983).

[5] Ibid.

[6] Data for FY 1974 from Army Deputy Chief of Staff for Operations and Plans chart reflecting Tactical Support Increment of Defense Planning and Programming Categories (DPPC), data for FY 1987 from same DPPC for FY 1987 from Defense Manpower Requirement Report, February 1986.

[7] Ibid.

[8] Larry Carney, "Webb Warns of Combat Support Weakness," *Army Times*, 16 February 1987, 18.

[9] Ibid.

[10] Major General Sam Damon and Brigadier General Ben Krisler, "'Army of Excellence' A Time to Take Stock," *Armed Forces Journal*, May 1985, 86.

[11] General Omar N. Bradley, *A Soldier's Story* (New York: Henry Holt and Co., 1951), 51.

[12] Hugh M. Cole and Dorothy K. Clark, et at., "A Preliminary Study of Approaches to the Problem of Combat/Support Ratios Within the Army Force Structure," Operations Division Staff Paper, Research Analysis Corporation Paper, May 1962, No. RAC (ORO)–SP–180, III–14.

[13] Ibid., III–9.

[14] Ibid., VII–21.

[15] Ibid., XII–3.

[16] Ibid., XII–2.

[17] Ibid., IV–12.

[18] Lieutenant Colonel Don Prettol, Office of the Comptroller of the Army, based on report of Army sample data collection and cost estimation, June 1985.

[19] Captain Randall, Training Directorate, Headquarters, US Army Training and Doctrine Command, discussion, 4 November 1986, based on Required Course Base Listing, Army Training Required Resource System, projected for FY 87, July 1986.

[20] Jim Burdette, Office of the Deputy Chief of Staff for Logistics Supply and Maintenance Directorate, data extracted from Army Master Data File, November 1986.

[21] Michael Duffy, "Grenada: Rampant Confusion, " Military Logistics Forum, Westport, CT, July–August 1985, 20–28.

[22] US Department of Defense, *Soviet Military Power*, (Washington, DC: US Government Printing Office, 1985), 9.

[23] General Paul Gorman, Presentation to Executive Leadership Seminar on Priorities in US Defense Policy, Brookings Institution, 8 April 1986.

[24] Frank Spinney, "The Defense Facts of Life," briefing prepared by OSD (PA&E) analyst, 5 December 1980, later presented to Congress.

[25] Major Edouard Quatrevaux, briefing to Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics), "Reshape the Logistics Force," March 1984.

[26] Agreement between the US Government and the Federal Republic of Germany concerning host nation support during crisis or war, Bonn, Federal Republic of Germany, 15 April 1982.

[27] Rogers, Hearings.

[28] Crist, Hearings.

[29] Defense Manpower Requirements Report, FY 1987.

[30] General Glenn Otis and Major (P) Robert P Driscoll, "CSS: Crucial Dimension of Deterrence in Europe, " *Army*, October 1986, 82–89.

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The Evolution of Army Logistics in Context

Introduction. In the final chapter of his excellent study of Army administration Army historian James E. Hewes, Jr., sets the changes in Army management and organization, most of which affected the logistical support of the Army even more than strategic or tactical matters, in the context of national development in the twentieth century and especially the evolution of business management technique. Hewes thus provides the framework for a broad understanding of the evolution of Army logistics.

Reflecting on the struggles over executive control in business and government Elihu Root concluded: "The natural course for the development of our law and institutions does not follow the line of pure reason or the demands of scientific method. It is determined by the impulses, the sympathies and passions, the idealism and selfishness, of all the vast multitude, who are really from day to day building up their own law."[1]

The history of the organization of the War Department since Root's day has amply illustrated his observation. The central issue from 1900 to 1963 has been the nature of executive control—not whether there should be any executive control at all but whether this control should be exercised at the traditional bureau level or at the level of the Secretary and the Chief of Staff or, more recently, in the Office of the Secretary of Defense. In turn, this struggle has reflected a similar one in the American society at large as the nation evolved from a loose-jointed agrarian federation into a highly industrialized, urban nation. Secretary McNamara in 1963 represented the rationalists, beginning with Root, who sought to apply pure reason and scientific method to military organization. He once remarked:

> Some of our gravest problems in society arise not from overmanagement but out of undermanagement. . . . Exploding urbanization has

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Reproduced from James E. Hewes, Jr., *From Root to McNamara: Army Organization and Administration, 1900–1963* (Washington, D.C.: U.S. Army Center of Military History, 1975), pp. 366–74.

> been a fact of life in the Western world for more than two hundred years . . . but there is no evidence that man overmanaged this problem; there is much evidence that he has undermanaged it.[2]

A military organization would appear to be far more amenable to centralized and rational management than the process of industrialization and urbanization of society at large in a democratic state devoted to the principle of free enterprise. Yet it too has been subject to the "sympathies and passions, the idealism and selfishness" both of members of the organization itself and the political representatives of the larger society it serves.

From Mr. Root's institution of the General Staff as a means of controlling the bureaus until 1917, when the United States entered World War I, that agency had to struggle merely for the right to exist in a hostile political environment. At the end of this period Congress, influenced by traditional, agrarian antimilitarism, had all but legislated the General Staff out of existence. In World War I the resultant tiny staff devoted its efforts at first to organizing, partially training, and transporting overseas a huge citizen army. The failure of Secretary Baker, an old-fashioned Jacksonian, to assert effective authority over the bureaus led to an almost complete breakdown of the war effort in the winter of 1917–18. Under the pressure of events and goaded by industry and Congress, a revitalized General Staff under General Peyton C. March established effective control for the first time over the bureaus.

After the war the immediate necessity for these controls disappeared, and the bureaus reasserted their traditional freedom through Congress. In the long armistice that followed the General Staff did not have to struggle for existence. It was practically one bureau among equals, although in the late thirties under the impact of a modest rearmament program it was able to assert itself with greater confidence.

The infinitely greater mobilization required in World War II demanded correspondingly greater executive control, and General Marshall found it necessary to establish control not only over the traditional bureaus but the General Staff as well. He centralized administrative responsibility in three major commands—Army Ground Forces, Army Air Forces, and Army Service Forces. This left him free to devote his own efforts to his principal function of advising President Roosevelt on strategy and the conduct of military operations around the world. In carrying out these duties Marshall relied heavily upon a greatly expanded Operations Division of the General Staff, while the rest of the latter body was shunted to one side for most of the war.

General Marshall wanted to establish equally firm executive control over a unified department of the armed forces after the war. The Navy frustrated his plans for unification while the Army staff, led by the traditional bureaus, abandoned General Marshall's tight control over the Army for a decentralized organization similar to the prewar pattern.

After passage of the National Security Act of 1947 and its amendment two years later, effective executive control over the Department of the Army gradually passed from the Secretary of the Army to the Office of the Secretary of Defense

and the Office of the Defense Comptroller, culminating in the managerial revolution of Secretary of Defense Robert S. McNamara. Control over military operations in this period passed from the services to the Joint Chiefs of Staff. Within its own administrative sphere the Department of the Army sought to assert increasingly greater control over internal operations through new functional program and command management systems. It made special efforts to develop more effective means of co-ordinating the technical services which led ultimately to their demise as independent commands in the Army reorganization of 1962.

As the pendulum swung back and forth, the protagonists remained the same. On the one side were the traditionalists, both civilian and military; on the other were the rationalists seeking to establish the same kind of executive control over the Army and Navy that had been imposed on some industries by modern, giant corporations.

The traditionalists represented the customary methods of conducting the business of the Executive Branch of the federal government where power and responsibility have been deliberately fragmented among competing bureaus. As a permanent bureaucracy they possessed intimate, detailed knowledge of how the Army and the War Department operated. Temporary, politically appointed secretaries came and went with little knowledge of these details. They were forced to rely upon the bureaucrats for information, and thus the bureaus more often than not controlled the secretaries instead of the reverse.

Secretary Root intended the General Staff to be a permanent agency whose knowledge could be used to balance that of the bureaus and to supervise their operations. Instead controlling the bureaus the General Staff adapted itself to their traditional procedures. Before the World War II reorganization General Marshall accused it of the very bureaucratic vices for which Mr. Root had criticized the bureaus. The General Staff in effect became another collection of bureaus.

Except during wartime, when tight controls over their operations were forced upon them, the traditionalists were able to hold their own. After both world wars they reasserted their independence. They were also able to dilute several boldly announced reforms in the process of executing them, notably the Palmer reorganization of 1954–55. Except in the cases of Generals Wood, March, and Marshall, they were successful in sidetracking attempts to reform their methods of reaching decisions through "completed staff actions."

The principal rationalists reflected experience with large corporate enterprises. Secretary Root, his protégé Henry L. Stimson, Robert Lovett, and others sought to establish control by integrating the operations of the department along functional lines. The General Staff was functionally oriented, a pattern first adopted by continental railroads in the United States. Secretary McNamara's program budgets was a management control technique pioneered by DuPont and General Motors after World War I. After World War II a number of large industrial corporations followed their example, including the Ford Motor Company who hired Mr. McNamara and others to revitalize that company's antiquated management procedures.

The principal military reformers were Generals Wood, March, and Marshall. Their civilian allies included industrial management experts and specialists in

public administration, particularly Bureau of the Budget officials like Leonard W. Hoelscher, Charles J. Hitch, and Thomas D. Morris. The most prominent spokesman for rationalization along functional lines during World War II was General Brehon B. Somervell, Commanding General, Army Service Forces, and his principal instrument for carrying out these reforms was the Control Division, under Maj. Gen. Clinton F. Robinson.

In 1946 the abolition of ASF and its Control Division was a major goal of War Department traditionalists because of its insistence on functionalizing the Army's supply and administrative services. But the emerging cold war with the Soviet Union did not permit the relaxation of international tensions and a return to the relatively control-free atmosphere of a small peacetime army. New conditions required greater controls over the Army's supply and administrative system, and the new Office of the Army Comptroller picked up where the ASF's Control Division had left off at the end of World War II.

In their efforts to modernize the Army's administration, the rationalists were aided by outside management consulting firms and by special commissions on governmental organization chartered by Congress. The prestige of the members of these commissions, particularly the two Hoover Commissions, greatly influenced Congress and led it to abandon its traditional alliance with the bureaus in the Army and Navy.

The revolution in technology and the consequent mounting costs of new weapons systems also created conditions requiring greater controls over military research and development programs. At the same time, the development of automatic data processing equipment gave managers a device for asserting greater centralized control than had been physically possible earlier, once they learned how to employ them effectively.

The increased employment of industrial management techniques and greater sophistication of statistical and fiscal controls did not solve all the Army's management and organizational problems. From the days of Secretary Root certain problems appear again and again, and there is no indication that they have yet been solved. They all have one feature in common. They are characteristics of large bureaucratic or corporate organizations and testify to the resistance of traditionalists to changes in their accustomed methods and procedures.

Reformers have repeatedly insisted that the Army staff divorce itself from the details of administration. Just as repeatedly, Army staff spokesmen have insisted that it was practically impossible to separate planning from operations. Minutely detailed centralized control over field operations at the bureau and later the General Staff level has been characteristic of the federal government from the earliest days of the republic. Each time reformers succeeded in removing the Army staff from operations through drastic reductions in personnel and other devices, a reaction has set in and in a few years the Army staff had proliferated again in numbers and functions. The pendulum continues to swing back and forth.

Another problem reformers have sought to eliminate unsuccessfully has been the inability of the Army staff to distinguish between minor administrative details and major policy issues. Decisions over the issuance of toilet paper or belt buck-

les seemed to critics like General Hagood and Besson to receive equal attention with decisions over the development of missiles. An allied factor was the compartmentalization characteristic of bureaucratic organizations where even minor differences of opinion tended to go all the way to the top before they could be resolved. Secretary Root tried to rid himself of this problem by passing it on to the Chief of Staff. Secretary Baker allowed much of his time to be frittered away on such matters. General Marshall delegated authority freely to deal with these details to his three major field commands. Management experts counseled executives to "manage by exception" and avoid immersion in details which prevented them from asserting effective control over their organizations.

Perhaps the most important of the bureaucratic vices that rationalists sought to eliminate was the lengthy delay built into the Army staff's decision-making process by the requirement to obtain concurrences from all agencies with a "cognizant" interest in any issue. The resulting reduction of decisions to the lowest common denominator in order to obtain agreement was a constant frustration. General March disapproved of decisions by committees or boards, saying that boards were "long, wooden, and narrow." General Marshall demanded quick action and quick decisions through his Green Hornets, a method that survived only so long as he was Chief of Staff. Secretary McNamara, in criticizing the committee system, tried to impress on the services the need for prompt decisions. Despite his efforts, the completed staff action still remained the standard procedure for making decisions within the Department of the Army with its traditional delays and compromises.

Brilliant managers and administrators may be relatively rare in the federal bureaucracy, but in both world wars such men arose who met successfully the challenges of the war by asserting effective control over the department's operations. When Mr. Root outlined the administrative mismanagement of the War Department during the Spanish-American War to the Senate Military Affairs Committee, its chairman, Senator Joseph Hawley of Connecticut, a Civil War veteran who was customarily called General, suggested that General Grant would have solved the problem easily. When reminded that General Grant was unfortunately no longer available, the senator replied that "God always sends a man like him" in time of need.[3]

The men who have arrived in time of need have, however, normally stamped their own personalities on the organization and have not necessarily created organizations that fitted the style of their successors. The reorganization of the Army in 1963 seemed in many ways a final triumph of the rationalists over the traditionalists. Yet the undertones of the old struggle did not disappear, and changing technology and conditions have dictated piecemeal changes in defense and Army organization since 1963. The organization on which Secretary McNamara had heavily placed his personal stamp came in for its share of criticism by a "Blue-Ribbon Panel" headed by Gilbert W. Fitzhugh, chairman of the Board of the Metropolitan Life Insurance Company, in 1970. The panel reiterated the standard complaints of reformers since the time of Root about fragmentation of responsibility for decisions, excessive size of staffs, the constant thrusting of minor issues

to the top for decision, and the delays in making decisions through committees and staff co-ordination.[4]

The organization and management of the Department of the Army since the McNamara reforms confirms these observations. Efforts to streamline decision-making by the Army staff were abortive. As a result of the recommendations made by Project 80 and Project 39a, Chief of Staff Regulation 1–13 of 10 June 1963 changed the traditional procedures involved in obtaining concurrences to require that concurrences needed be obtained only from those agencies with "primary staff responsibility" for any proposed action. Five years later, on 9 April 1968, this restriction was diluted by eliminating it so far as the Deputy and Assistant Chiefs of Staff were concerned. The restriction applied afterward only to the Army's special staff agencies.

The Blue Ribbon Defense Panel noted that the only means which had been developed within the Defense Department to circumvent the delays inherent in normal staff actions was to pull selected projects of high priority out of the system and place them under project managers or special assistants. As Deputy Secretary of Defense David Packard said: "Everytime we want something done in a hurry and want it done right, we have to take the project out of the system. We give a good man direction and authority and let him go—and it works. . . . On the other hand, when we are not in a hurry to get things done right, we over-organize, over-man, over-spend and under-accomplish." [5]

Within the Army there was an increase in the number of agencies reporting directly to the Chief of Staff, contrary to the recommendation of the Hoelscher Committee. Two of the traditional technical services were restored to their positions as special staff agencies reporting to the Chief of Staff on the grounds that the importance of their functions required it. The former Chief Signal Officer, designated as the Chief of Communications-Electronics but without any field installations under his direct command, became a separate staff agency in 1967, while the Chief of Engineers regained his special staff status formally in 1969.

The increasing use of Army troops in civil disturbances during the 1960s led to the creation of a Directorate of Civil Disturbance Planning and Operations (DCDPO) directly under the Chief of Staff in 1968. At the end of 1970 a Special Assistant for the Modern Volunteer Army (SAMVA) was created directly under the Chief of Staff. By the end of the decade also two project managers bad been appointed who reported directly to the Chief of Staff, for the SAFEGUARD missile system in 1967 and for the Surveillance, Target Acquisition, and Night Observation (STANO) in 1969.[6]

Bypassing normal staff and command channels in these instances tended further to centralize authority of the department's operation under the Chief of Staff. This was most apparent in the changes after 1963 leading to the creation in February 1967 of an Assistant Vice Chief of Staff responsible for the co-ordinating functions performed before 1955 by the three Deputy Chiefs of Staff. As indicated earlier, after 1955 these co-ordinating functions were placed under the Secretary of the General Staff whose responsibilities in this area increased greatly after 1963. The introduction of sophisticated automatic data processing systems

at all levels in the Army and Defense Department, the introduction of cost-effectiveness studies of weapons systems, force requirements, and the new "Program Budgets" categories based upon computers were responsible for this growth in the role of the Secretary of the General Staff and, ultimately, the assignment of responsibility for co-ordinating these functions to the Assistant Vice Chief of Staff, a three-star position. At that point SGS reverted to its pre-1956 role of providing administrative, communications, personnel, and management services for the Chief of Staff and the Army staff, including control of staff actions.[7]

Whatever future changes take place in Army organization and management, they will doubtless reflect the continuing struggle between the rationalists and traditionalists. This development, as mentioned earlier, partially reflects the larger effort of the American people to adapt their traditionally rural outlook, reflexes, priorities, values, and institutions to the requirements of an increasingly complex, urban, industrial society which places increasing restraints on the freedom of action, not only of individuals, but also of the myriad corporate organizations, large and small, public and private, that make up the American federal system of government and free enterprise. These developments also reflect the restless, shifting world environment in which the United States lives where the specific requirements of national security are constantly, often unpredictably, changing. The survival of the United States depends upon its success in adapting itself to these changes.

Notes

[1] "Public Service by the Bar," address of the president [Elihu Root], reprinted in *Report of the 39th Meeting of the American Bar Association*, Chicago, Ill., 30–31 Aug and 1 Sep 16.

[2] Robert S. McNamara, *The Essence of Security* (New York: Harper and Row, 1968), p. 119.

[3] *The National Defense*, pp. 17–18.

[4] Blue Ribbon Defense Panel, Report to the President and the Secretary of Defense on the Department of Defense, 1 Jul 70, pp. i–ii, 10–53.

[5] Address by Hon. David Packard, Deputy Secretary of Defense, at the Armed Forces Management Association Dinner, 20 Aug 70.

[6] OCMH Study 63, Evolution of the Army Staff and Secretariat, 1775–1970, 8 Oct 70, pp. 56–61.

[7] *Ibid.*, pp. 58–61.

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The Continuity of Change

Introduction. Historian of Army logistics James A. Huston summarizes the evolution of United States Army logistics from the Revolution to the late 1950s and places the changes in doctrine and organization in the context of overall changes in American society and the art of war since 1775. In particular he notes the enormous changes in technology, the growing scope and complexity of modern warfare, and the revolution in communications, all of which have significantly influenced the Army's logistical requirements and capabilities.

The evolution of U.S. Army logistics has followed the experience of war—to an extent—and the revolutions in warfare accompanying the industrial revolution of the whole period of the nation's existence. Increasingly frequent references to the "growing complexities of modern warfare" are above all logistical allusions, for they usually refer to the production, repair, and operation of new types of weapons, vehicles, and other equipment. These revolutions have proceeded at an ever-quickening pace. A soldier under Washington somehow transposed to the army with Scott in Mexico probably would have less feeling of unfamiliarity than, say, a soldier under Pershing transposed to the armies of Eisenhower or MacArthur in World War II. Still, the growing rapidity of change did not alter the bonds of continuity nor render invalid the experience of the old for adaptation to the new.

The age of change saw manufacturing move from the home or the small shop to the big factory, and invention move from the shop to the laboratory. The introduction of interchangeable parts paved the way for mass production and automation which moved ahead as first steam, then electricity replaced direct water power, and oil and gas surpassed wood and coal in many plants as direct fuel. It was the age when rail and animal power gave way to steam and the internal combustion engine; when the speed of communication leaped above the speed of transportation to almost instantaneous electrical transmission. All these advances became evident in the manufacture of military weapons and equipment and in the transportation of troops and supplies.

Reproduced from in James A. Huston, *The Sinews of War: Army Logistics, 1775–1953* (Washington, D.C.: U.S. Army Center of Military History, 1966), pp. 679–90.

The telegraph and the steamboat modernized the Mexican War to some degree, and then, with the added facilities of the railroads, made of the Civil War in a sense "the first modern war." In the twentieth century the revolution in warfare already evident in the Civil War rushed toward completion, but it would not be accomplished in the first twenty years of the century despite the magnitude of World War I. New weapons changed the character of war markedly, but the real revolution in warfare did not come until the revolution in transportation had spread through military operations completely. The revolution is not in the introduction of the railroad, the motor truck, and the airplane, but in their widespread use. Industrialization without motorization and mechanization, or with rudimentary motorization and mechanization, characterized the War with Spain and World War I, respectively, and in the latter, mobility on the battlefields of the Western Front was lost. Aside from its great magnitude, what was the chief characteristic of war in the first fifth of the twentieth century? Was it not this very lack of mobility? Greatly increased tonnages of supplies, and equipment could be produced, and could be moved overseas. They could be moved by railroad to the vicinity of the battlefield. But motor transportation had not been developed to the point where it could with equal speed move those vast quantities of supplies to the battlefield, and across the battlefield; therefore dependence for this last stage of transport continued to be on horses and mules, which themselves required transportation and provisions. The horse virtually disappeared from the battle lines in World War I, but not from the supply lines. This was the period of transition—a period of stabilized warfare between the mobility of the Civil War and the mobility of World War II when American motor vehicles compounded the mobility that German panzer divisions had restored to the battlefield, and once more logisticians faced the nightmare of armies outrunning their supplies.

The armies of World War I were more closely tied to the railroads than ever before, and their range of operations beyond the railheads was less, not more, than in the Civil War. Every improvement in equipment and every expansion in industrial capacity simply added to the matériel requirements and to the burden on transportation, but did not relieve any of the burden on the soldier's back. The requirement of about four and one-half pounds of supplies per man per day for the Civil War soldier multiplied to thirty pounds per man per day as an "absolutely essential" minimum, and sometimes figured at forty and even fifty pounds for the American Expeditionary Forces in France. Caesar's men carried as much as seventeen days' rations in their packs; Napoleon's soldiers carried bread and flour for fifteen days; the Civil War soldier ordinarily carried three days' rations, and not infrequently had to carry an extra five days' hard bread and coffee; the soldier of World War I, while carrying an even heavier load, seldom carried more than two days' rations.

Increases in military production tended merely to increase the demand and, as war became more industrialized, competition between the fighting forces and the factories for the manpower needed for a maximum war effort also increased. At the turn of the century it was calculated that for each man in the armed forces the product of one man in war industries and services was required.

Industrialization introduced a whole new dimension into logistics. "Here for the supply officer will be yet further difficulties; for time and space calculations,

instead of being based on the standard performance of man and beast, which within small limits has not changed, will depend on the skill of the engineer and the output of the factory."[1]

War contributed greatly to the quickening pace of the industrial revolution, which in turn was to have such an impact on modern war. Eli Whitney introduced the principle of interchangeable parts into the arms industry. Improved steel and the growth of mass production grew out of immediate demands of war. The Civil War revealed to industry in the United States potential and opportunities never before recognized, and industrial expansion in the succeeding decades brought new capacity and new requirements to the ways of the twentieth century. Again, the enforced co-ordination and rationalization of industry during World War I paved the way for the great expansion of the 1920's, and carried the process of multiplication of supply requirements forward to World War II. The impact of industrialization on war was not always recognized at the time of its greatest growth—or it was misinterpreted. Jean de Bloch, a noted student of modern war, was so impressed with the phenomenon that in 1899 he published an impressive study, *The Future of War in Its Technical, Economic and Political Relations.* In this study (which the World Peace Foundation, with a rare sense of timing, reissued in 1914) de Bloch assembled weighty statistical evidence to prove that the dimensions of modern armaments and the organization of society had rendered the prosecution of war an economic impossibility.

For the position of the United States in world affairs, 1890 was a highly significant date. That year the United States surpassed Great Britain in the production of pig iron and steel. Already ahead of France, Germany, and Russia in output of pig iron by 1870, and in output of steel by 1875, American industrial production showed remarkable increases during the whole period between the Civil War and World War I.

Even so, the United States entered World War I with a sense of military inferiority, for the production of military goods not only had failed to keep pace with U.S. industrial expansion, but it had not kept up with the other major powers of the world. Nevertheless the potential existed, and even though soldiers of the AEF had to depend on France and Great Britain for most of their finished weapons, that potential was clearly demonstrated in the war production program.

In World War II the American potential, by force of necessity, had to be developed to the greatest achievement of military production in history. No longer the chief recipient, but instead the chief provider of weapons and equipment, the United States had become in fact the "arsenal of democracy"—and would continue to be after that war, with military assistance programs around the world and as the leader of a coalition in limited war in Korea.

Administration

In this increasingly complex modern war logistical activities demanded more and more attention. The whole field of administration and logistics was one in which the Army had been forced to excel. For the Army in mid-twentieth century,

fighting was becoming secondary to administration. Already noticeable in World War I, and more so in World War II, the trend accelerated in the Korean conflict.[2] Much to their consternation, a great many old soldiers who longed for the smell of gunpowder and the chatter of machine guns faced the more likely prospect of having to settle for the smell of mimeograph ink and the chatter of typewriters. Officers and men who felt they were contributing nothing to a war effort if they were not on the firing line had to develop a broader view of war's requirements. Back in the 1930's the *U.S. Army Recruiting News* carried a brief feature in each issue entitled, "Things the Army Does Besides Fight." A report of what the Army did besides fight in the 1950's would have practically filled the paper—as in fact to a lesser degree it would have in the 1930's if viewed more broadly. Actually most of the Army did not fight—an infantryman on leave from a combat area, accustomed to being surrounded by infantrymen like himself and to think of the Army as made up mainly of the same kind of soldiers, was much surprised at how relatively few infantrymen he might see in the cities of the rear areas. He represented a military minority. Most of the Army was not in the combat arms—the infantry, armor, and artillery. Most of it was in the technical services—the engineers, quartermasters, medics, and chemical, signal, and transportation units—and in the administrative services and the headquarters which guided and supervised the tactical and service units from the combat zone to the Pentagon. In the late fifties the Army lost altogether its status as a distinctive combat force and its mission became to raise, organize, equip, and train components for assignments to unified commands. Actually this was not a great change, for the Army General Staff never had controlled operations in the theaters.

The Army's administrative and supply and service functions were not confined to the support of its own units; it also had broad responsibilities for supporting the other services—especially the Air Force, and in Korea the Marine Corps—and for executing the military aspects (and sometimes the civilian aspects, too) of the government's foreign assistance programs. The Army was the executive agency for the Joint Chiefs of Staff for the Far East Command, a unified command; Army Forces, Far East, was executive agency for the commander in chief, Far East Command, in matters of logistics affecting more than one service. At the same time the Army was the executive agency for the Joint Chiefs of Staff for the European Command, and it was executive agency for the Department of Defense for the Mutual Defense Assistance Program, and the agency for providing necessary logistical support for other members of the United Nations in Korea. Again in the late fifties, even those direct lines of participation were weakened as new procedures provided that service commanders take their orders directly from the Joint Chiefs of Staff acting for the President and the Secretary of Defense without any one service acting as "executive agent."

Whether because of de-emphasis resulting from lack of apparent need, or overemphasis on economy in the country when it came to military affairs, the Army, at least until after World War II, never was able to achieve an organization and structure in peacetime that could serve it well logistically in war. It must be granted that the bureau system did hold up fairly well, with relatively minor mod-

ifications, in the Mexican War and, after a slow start, in the Civil War. But major overhauls were necessary in top organization for the War of 1812, for the War with Spain (even if it was *ex post facto*), for World War I, and for World War II.

Though Secretaries of War Calhoun and Root saw clearly the Army's function in peacetime as being one of preparation for war, they never were able to shake the attitude of the Army—or the country—that peacetime was "normal," and that extraordinary measures naturally would be necessary whenever a war emergency interrupted the peacetime routine. The assumption seems to have been that without the prospect of war there was no real reason for the Army's existence, but the prospect of war (and wartime organization) has not been greatly in evidence in the Army's peacetime organization. Each time war has come the Army has had to reorganize.

The Army has always had a certain penchant for reorganization. The Topographical Engineers went back and forth, combined with or separated from the Corps of Engineers; Ordnance and Artillery were married and divorced; Subsistence was combined with Quartermaster, and Transportation separated from Quartermaster; but on the whole the bureaus intrenched themselves over the years so that even the creation of the General Staff was little more than superstructure added to structure—a frosting of apparent co-ordination and control over the cake of the old-line bureaus. Then the reorganization during World War I jarred the structure with the Purchase, Traffic, and Storage Division under General Goethals, exercising real control in many areas simply because control had to rest somewhere.

Army Service Forces in World War II went a step further toward centralized control. At the end of the war a great deal of debate went on over the question of continuing the ASF in peacetime (again the assumption that the peacetime structure should be different). The ASF was promptly abolished, but the substances of its central direction and control was carried over to the new General Staff organization by 1948. The new service, the Supply and Procurement Division of the General Staff (later redesignated the Logistics Division, then the Office of the Assistant Chief of Staff, G–4, and still later the Office of the Deputy Chief of Staff for Logistics) was more akin to Army Service Forces (less the latter's personnel functions) and to its World War I counterpart, Purchase, Traffic, and Storage Division, than to the World War II G–4.

The logistical organization of the Department of the Army proved to be equal to the shock of the Korean emergency with some expansion of personnel, and only relatively minor readjustments in organizational structure. In some ways the Army's service and supply organization still was bound up in too much red tape, encouraged too much duplication of effort, and was too ponderous for speedy operation. Some officers and civil officials thought a thoroughgoing reorganization would promote greater efficiency. Others felt that an all-out mobilization would require a return to something like the Army Service Forces of World War II. But many were satisfied that the organization of G–4 and the technical services that had been effective in peacetime and for the Korean War would serve as well for any future emergency. The relatively smooth transition from peace to war of

which it was capable recommended the current organization when it seemed likely that one emergency would follow another for a long time to come.

Most suggestions for further reorganization were more concerned with recasting the technical services than the general staff structure. Several of these suggestions went back to something like that which General Somervell had proposed during World War II for functional reorganization. One would have taken advantage of the lesson General Somervell had learned in his first failure and applied in 1945: to alter the substance without tampering with the historical designations, so that all procurement might be assigned to the Ordnance Corps, and all storage and distribution to the Quartermaster Corps, while the other technical services would perform the services of their specializations without supply functions. Others thought this arrangement awkward, and proposed that a whole new matériel command with functional divisions be set up. These discussions foreshadowed events that transpired during the next decade: establishment of the Defense Supply Agency; reorganization of Headquarters, Department of the Army; abolition of the offices of most of the technical service chiefs; and establishment of the Army Matériel Command.

Organization for logistical support in the theaters of operations never has been completely clear and satisfactory. Washington's position as Commander in Chief and as commander of the main army in the Revolution left some anomalies in his relations with the government and with the other armies. It was not always clear, for instance, whether the quartermaster with the Northern Army was responsible to the commander of the Northern Army, to Washington, to the quartermaster in Philadelphia, or to the Board of War and the Continental Congress. Scott, while commander of the army in Central Mexico was also General in Chief of the U.S. Army, but he had sharp differences with the War Department on matters of supply. Pershing's organization in France was rather well developed, but relationships, particularly of the G–4 and the special staff of General Headquarters with Services of Supply, were not well defined, nor was GHQ control of the Advance Section in keeping with the SOS organization. There also was conflict between territorial and functional organizations—the base sections and the military railroad, for instance. Many of these difficulties reappeared in the communications zone organization in Europe in World War II, when responsibilities again were not clear between theater and communications zone headquarters. There was besides the added complication of Supreme Headquarters, Allied Expeditionary Force, with its own G–4 staff section. In the island warfare of the Pacific the preference was for an Army service command organization attached to the field armies, and the communications zone did not ordinarily provide close support.

During the Korean War the administrative organization of the Far East Command retained certain discrepancies until the beginning of 1953 by which time it had developed a theater structure closely paralleling that outlined in established doctrine. The principal modifying factor on the higher level was the United Nations Command Headquarters—principally the main divisions of Far East Command Headquarters with the addition of combined staff sections including members from other co-operating nations. But the actual direction and execution

of logistical activities continued to be on a national basis, and the logistical organization developed by 1953 generally "followed the book," with certain local adaptations. The principal deviations were in the designation of the Korean Communications Zone and in the organization of a single section headquarters under it. Actually Army Forces, Far East, served as the theater communications zone headquarters, while Korean Communications Zone was a base or intermediate section, yet the resulting anomaly, if such it was, probably was traceable to the book itself. In a unified command where an Army officer was commander in chief, it was to be expected that he would command military operations directly through the field army commander (or army group commander if there was one). With no tactical functions, the theater army headquarters, in this case Army Forces, Far East, was concerned almost wholly with administration and logistics. In these circumstances a separate theater communications zone headquarters would have been superfluous.

Perhaps more serious than the approved anomaly of the theater logistical structure was the "layering" of logistical headquarters in Korea resulting from the establishment of a single section headquarters (Korean Base Section) under Korean Communications Zone Headquarters. It is true that the supervisory functions of KCOMZ were broader—they included control of the 3d Military Railway Service and responsibilities for area administration, prisoners of war, and civil affairs—yet in supply functions duplication of effort often appeared in practice between KCOMZ and Korean Base Section. The attempt of the higher headquarters (KCOMZ) to restrict its activities to planning, policy making, and supervising proved to be impractical. On the other hand Korean Base Section, which was supposed to be the operational headquarters for supply, found itself at a disadvantage in having the railroad under a separate headquarters. A single headquarters with complete operational control of all facilities, seemed to be more desirable for a communications zone not requiring two or more sections. Several months after the end of hostilities, the two headquarters were combined and subordinate area commands were set up.

Requirements

Requirements for supplies and equipment needed for the conduct of war, in quantities as well as in kinds, changed with the changing character of war. Military operations naturally reflected the development of new weapons, new vehicles, new food preparations, and new devices of all kinds. Requirements for trucks and gasoline and rubber tires replaced requirements for wagons and horses and forage. But many new items, such as telephones and radios and gas masks and barbed wire and medium tanks and airplanes, were not replacements for older equipment and weapons at all, but additions to the lengthening list of items considered essential for the modern army.

The emphasis placed on research and development since World War II added to the burden of keeping requirements accurate and logistical planning current, but it also made possible the rapid expansion of military power, the one danger being

that innovation would become such a fetish that change would be sought for its own sake and many useful items of equipment would thus be prematurely discarded. Such psychological obsolescence of matériel would have the effect of reducing serviceable reserves and adding unduly to procurement objectives. The old dilemma of highest quality and greatest quantity would continue with even greater force than before.

In terms of total tonnage, requirements for the support of Army units in combat seemed to grow interminably. This has been due in part to the constant addition of new items of equipment, to the use of heavier artillery weapons and more automatic weapons with higher rates of ammunition consumption, and to the increasing use of heavier tanks and trucks on which modern mobile warfare depended. It also has been the result of a tendency to carry to the battlefield the nation's rising standard of living—to make necessities of items which in other armies or in earlier times would have been considered the greatest luxuries. Secretary of War Calhoun as early as 1818 remarked on the disparity between what an American soldier required and what would satisfy a "Turk." In North Africa in 1942–43 it was taking .7 of a measurement ton a month on the average to supply a British soldier, while it was taking 1.3 measurement tons to supply an American.[3]

The change in the nature of requirements pretty much relegated to mythology the prospect of an Army's living off the country. Although Grant and Sherman and Wilson at various times during the Civil War had been able to cut their supply lines and live off the country, in those situations almost continuous movement to new forage was possible, and relatively little expenditure of ammunition was necessary. Gasoline, though much more efficient than hay and oats for moving supplies, was not to be found stored in barns or growing in the countryside, and neither was the ammunition which comprised a constantly growing element of the average supply requirement. By the time of World War II, fuel and ammunition accounted for about two-thirds of the tonnage of average daily supply for ground and air forces. In an attack against a hastily organized defensive position, an infantry division on the average fired 386 tons of ammunition a day, and the armored division used 361 tons a day. An armored division—extending out to a length of forty-six miles if moving in a single close column—consumed 146,000 gallons of gasoline in one hundred miles; and nearly twice that if moving across country under battle conditions. An infantry division needed 68,500 gallons of gasoline to move its vehicles one hundred miles. [4]

Possibly U.S. Army units were too closely tied to their vehicles, too road-bound. The heavy losses in Korea when enemy roadblocks cut lines of withdrawal would suggest this. At any rate it made a strange case to plead disadvantage in encountering an enemy not relying so heavily on motor transportation.

Research and Development

A great change of recent times has been in the Army's attitude from one of almost total rejection of any new idea for weapons and equipment, as evidenced

to some extent by General Scott during the Mexican War and General Ripley during the Civil War, to an attitude of active encouragement of research and development. The Army of the nineteenth century made little if any attempt to ferret out new ideas, and when one was proposed the burden of proof for the worth of the device was entirely on the inventor. The Army of the twentieth century, especially since the stimulus of the mobilization of science and technology during World War II, has encouraged research and development both to meet future requirements and to improve present matériel. Developments in the decade following the Korean War have strengthened some of the tentative principles and general conclusions drawn from earlier experience, and have raised doubts about others. In any event, sweeping revolutions in weapons and equipment, transportation, communications, and organization were bound to have an impact that would change the patterns of Army logistics.

The increasing emphasis on research and development after the Korean War began to pay off in whole new families of weapons and vehicles. The most spectacular developments were the rockets and missiles. Before the end of the Korean War a 280-mm. gun designed to fire an atomic projectile had been produced, and important strides had been taken toward the development of rocket-propelled delivery systems for tactical nuclear projectiles as well as for conventional high explosives. The Honest John was a free rocket carrying a 1,500-pound warhead for a distance of up to about fifteen miles, and the Little John was being developed as a smaller weapon able to do about the same thing. In the guided missile category, the Corporal was the most important for short-range tactical use, with a range of about 75 miles, but it would be replaced by the more powerful Sergeant. For longer ranges, the Redstone, a liquid-fuel missile, six feet in diameter and sixty-nine feet long, was one of the first effective models, while the Pershing was being developed as a solid-fuel replacement for it. The Jupiter C, using liquid fuel, had a range of some 3,300 miles. Nike Ajax was the first in a family of surface-to-air guided missiles, and it was to be replaced by Nike Hercules. Most controversial was the Nike Zeus which the Army was developing as an antimissile missile. In addition, there were the Hawk for low altitude antiaircraft missions, and Talos, inherited from the Navy.

In more conventional weapons, too, rapid changes were taking place. A new rifle, the M14, designed to fire a standardized 7.62mm. NATO cartridge, was adopted to replace the M1 rifle, the carbine, and the Browning automatic rifle, though it was being made obsolete even before it came into full use. A new M60 machine gun, using the NATO cartridge loaded in a link belt, and firing at a rate of 600 rounds a minute, replaced all the old .30-caliber machine guns, and was assigned to all rifle companies instead of to separate heavy weapons companies. The 81-mm. mortar replaced the 60-mm. in the rifle companies.

The Patton 48 medium tank and the M103 heavy tank came into full use, but a new medium tank, the M60, carrying a 105-mm. gun and powered by a 750-horse-power diesel engine, was being developed to replace both.

Probably the greatest innovation for the infantry was the introduction of the armored personnel carrier, a cross-country vehicle operated by a crew of two, and

capable of carrying ten passengers. A newer aluminum model of this vehicle was being developed, weighing only half as much as the earlier model. Experiments with "aerial jeeps," "flying platforms," and other contrivances intended to increase battlefield fire power and mobility promised further logistical modifications.

With the wholesale introduction of new types of weapons, and completely new categories of increasing complexity, the greatest immediate logistical problem was in the supply of parts to keep them operational. The most difficult aspect of this problem was in estimating requirements without the benefit of meaningful experience factors.

Transportation

Long-range jet transports pointed the way to great changes in the transportation picture, as greater speed, greater capacity, and the use of lower grade fuel promised some reduction in the expensive secondary requirements of air transportation. This might in turn change the whole pattern of the distribution system in the interest of saving the costs of stockpiling reserves along lengthy supply lines. Still it seemed that in the foreseeable future the greatest use of air transportation would be in the movement of personnel to areas where equipment had been prepositioned. It seemed unlikely that for some years to come ocean carriers would be superseded as the principal means of transporting matériel, for developments promised a tremendous speed-up in ocean transportation and automation made its great impact on loading and unloading, which always had been the bottlenecks in ocean shipping. By the 1960's a ten-man gang using new equipment could load a ship at San Francisco in just two shifts, where a few years before the same job took a fourteen-man gang twelve shifts to complete; six longshoremen could unload the cargo from a Liberty ship in nine days whereas earlier it would have taken eighteen men fourteen days. To speed up the unloading of vessels the Army developed a continuous circuit tramway system, and for moving cargo inland from beaches it developed an overland conveyor system. Equally revolutionary for cross-country transportation off the beaches was the logistical cargo carrier, a car with a capacity of fifteen tons, equipped with huge tires for cross-country movement, which could be linked with other cars to form a tractor-drawn overland train needing neither tracks nor roads.

Communication

Perhaps the most spectacular revolution of all was in communication. The introduction of automatic data processing promised to have a greater impact on logistics than either the telegraph or the radio. It provided the basis for unprecedented centralization of control over supply, and for procedures to speed up the whole supply operation. Depots could be linked together and requisitions handled quickly at national inventory control points. With the use of data processing and new procedures, processing time at the source of supply soon was reduced by more than one-half. Standard requisitioning and inventory control procedures

(referred to as MILSTRIP) and standard transportation and movement procedures (MILSTAMP) soon were being extended to all services, and the Department of Defense itself was becoming the principal co-ordinator of military supply.

The Organization Revolution

Recurring proposals for functionalizing the Army logistical organization and modifying or eliminating the technical services or bureaus as separate entities finally came to fruition in 1962, accomplishing what many had assumed never could be done. Of the technical service chiefs, only the Chief of Engineers and the Chief of Transportation, but with only service functions, remained under the supervision of the Deputy Chief of Staff for Logistics, while a new Chief of Support Services acquired most of the service functions of The Quartermaster General. The Surgeon General, also with only service functions, was placed under the Deputy Chief of Staff for Personnel; the Chief Signal Officer continued his service functions under the Deputy Chief of Staff for Operations. The supply operations previously performed by the technical services were assigned to a new organization, the Army Matériel Command, while responsibilities for research and development and testing, and for battlefield logistics doctrine, were assigned to the Combat Developments Command. The Quartermaster, Ordnance, and other corps remained as designations for service troops, but with the limited exceptions noted above, there no longer would be a bureau or a chief at the top.

The Department of Defense itself entered the logistical organization revolution with the establishment of the Defense Supply Agency (DSA). In effect, the Defense Supply Agency is a "fourth service of supply"—it is a joint agency under military direction responsible, not to the Joint Chiefs of Staff, but directly to the Secretary of Defense, its control extending over all federally catalogued supplies for all services. By mid-1963 it was handling more than one-third of all military supplies, and soon thereafter it was handling at least half of all the supplies. The Defense Supply Agency, geared for war as well as peace, is developing a harmonized system of supply among the services so that requisitions can be funneled into central points and referred automatically to depots and field agencies, with the probability that the whole system of oversea supply divisions in filling requisitions from oversea theaters can be bypassed. In the future the history of Army logistics would be an integral part of Navy and Air Force logistics history and that of the Department of Defense.

Experience for the Future

No one aspect of the Army's logistical experience can be singled out as most valuable in providing guidelines for the future, for the future is, as always, uncertain. One thing can be forecast with assurance—the continuation of change. But it may also be assumed that, however far-reaching the changes, there must always be links with the past. Any general conclusions drawn from history as a whole must include the principle of change and the principle of continuity. No situation can

ever be exactly the same as a previous one, nor can any situation be absolutely unique, having no connections with the past. Through experience, whether it is derived from actual participation in events or vicariously as through the study of history, one becomes aware of the swiftness and magnitude of change. Moreover, in experience is the raw material for the imagination necessary to cope with change and to influence its course.

In searching the experience of World War II it seems probable that the war in the Pacific will have the greatest relevance for the kind of logistical activity that may be required from the Army in the immediate future. This appears to be so for two quite different reasons. First, in case of a general war, or anything approaching total war, the very existence of nuclear weapons is likely to require a dispersal of troops and resources over wide areas so that co-ordinating movements and bringing troops and resources together as needed may raise problems akin to those of supporting operations in the Pacific, wherever the locale of a new war might be. Secondly, the more immediate prospects of guerrilla warfare and "brush-fire" wars and crises at widely separated points, from Lebanon to Formosa, or Cuba to Vietnam, raise the problems of supporting relatively small forces over vast distances. For the same reasons an increasing relevance might be found, too, in the experience of the War with Spain, and even earlier in the support of Army operations on the Great Plains and in the mountains of the west between 1865 and 1890.

Whatever the future may hold, study of the experiences of all of the past will be needed. For military affairs this study must include a continuing concern with the experience of logistics.

Notes

[1] G. C. Shaw, *Supply in Modern War* (London: Faber and Faber, 1938), p. 165.

[2] For a penetrating discussion of this trend see Kent Roberts Greenfield, *The Historian and the Army* (New Brunswick, N.J.; Rutgers University Press, 1954), pp. 73–75, 90–93.

[3] C. B. A. Behrens, *Merchant Shipping and the Demands of War*, "History of the Second World War—United Kingdom Civil Series" (London: Her Majesty's Stationery Office and Longmans, Green & Co., 1955), p. 370; FM 101–10, August 1949, p. 303.

[4] FM 101–10, August 1949, pp. 244–47, 269.

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"A Sad, Embittered Race of Men"

Introduction. Having come thus far, the reader of this anthology is probably prepared for a bit of satire. The origin of this short essay, which concludes our collection of pieces on Army logistics, is unknown, but the essay has been repeated often and contains, as do most satires, more than a little truth.

Logisticians are a sad, embittered race of men, very much in demand in war, who sink resentfully into obscurity in peace. They deal only with facts, but must work for men who traffic in theories. They emerge during war because war is very much fact. They disappear in peace, because in peace, war is mostly theory. The people who traffic in theories and who employ logisticians in war and ignore them in peace are Generals. Logisticians hate Generals.

Generals are a happily blessed race who radiate confidence and power. They feed only on ambrosia and drink only nectar except when they are drinking bourbon. In peace they stride confidently and can invade a world simply by sweeping their hands grandly over a map, pointing their fingers decisively up terrain corridors, and blocking defiles and obstacles with the side of their arms. In war they must stride more slowly because each General has a Logistician riding on his back and he knows that, at any moment, the Logistician may lean forward and whisper: "No, you can't do that!" Generals fear Logisticians in war, and in peace, Generals try to forget Logisticians.

Romping along beside Generals are Strategists and Tacticians. Logisticians despise Strategists and Tacticians. Strategists and Tacticians do not know about Logisticians until they grow up to be Generals—which they usually do—although sometimes Generals will discipline errant Strategists and Tacticians by telling them about Logisticians. This sometimes gives Strategists and Tacticians nightmares, but deep down in their hearts they do not really believe the stories—especially if the General lets them have an occasional drink of his nectar or bourbon.

Sometimes a Logistician gets to be a General. In such a case, he must associate with Generals whom he hates. He has a retinue of Strategists and Tacticians whom he despises, and on his back is a Logistician whom he fears. This is why Logisticians who become Generals are a fearsome and frustrated group who wish they were anywhere else, beat their wives, get ulcers, and cannot eat their ambrosia.

Some Suggestions for Further Reading

All of the works excerpted in this anthology deserve to be read and studied in their entirety. Indeed, a primary purpose of these volumes is to introduce the reader to those works in the hope that given time, opportunity, and interest, the whole book or article might be investigated. A careful reading of the works represented in this anthology would in and of itself constitute a good basic course in the history of U.S. Army logistics, but some students may wish to delve deeper into the subject. To assist in that purpose, a number of bibliographies exist, including my own *U.S. Military Logistics, 1607–1991: A Research Guide* (Westport, Conn.: Greenwood Press, 1992). I have provided here a few suggestions for further reading which point to the more obvious and more important works on the subject. Some, but not all, of the works represented by selections in this volume are again cited here and are identified by selection number. This list is arranged more or less chronologically; that is, the more important works covering the various historical eras are presented in chronological order.

One should perhaps begin with an understanding of logistics from a theoretical standpoint. There are only a few works which address the subject of military logistics from a broad theoretical perspective or try to cover the subject from ancient times to the present in one coherent piece. Perhaps the best known of the general theoretical studies is Henry E. Eccles' *Logistics in the National Defense* (Harrisburg, Pa.: Stackpole Press, 1959). Admiral Eccles' book remains the classic introduction to the subject of military logistics. Also useful in this respect is the older work by Marine Lt. Col. George Cyrus Thorpe entitled *Pure Logistics: The Science of War Preparation* (Kansas City, Mo.: Franklin-Hudson Publishing Company, 1917; reprinted, Washington, D.C.: National Defense University Press, 1986). Although written before World War II and not focused exclusively on the U.S. Army, George C. Shaw's *Supply in Modern War* (London: Faber & Faber, 1938) is thought provoking in all aspects of supply in modern war and is especially good in its historical comparisons of mobile self-sufficiency of land forces. Two books with almost identical titles are also valuable as introductions to the subject of logistics in general. Daniel Hawthorne's *For Want of a Nail: The Influence of Logistics on War* (New York: Whittlesey House [McGraw Hill], 1948) is a good study of the impact of logistics on strategy and tactics, with examples drawn principally from World War II. Kenneth Macksey's *For Want of a Nail: The Impact of War on Logistics and Communications* (London: Brassey's, 1989) focuses on technological developments in logistics and communications since the late nineteenth century and their impact on warfare. For a briefer definition of the place of logistics in modern war one might reread John D. Millett's "Logistics and Modern War," in *Military Affairs* 9, no. 3 (Fall 1945): 193–207 (Selection 3).

Good general histories of military logistics are not plentiful. Jerome G. Peppers, Jr., *Military Logistics: A History of United States Military Logistics,*

1935–1985 (Washington, D.C.: Logistics Education Foundation Publishing, 1988) is worth a glance. A very brief overview of the history of logistics from a U.S. Army perspective is provided by Thomas R. Palmerlee and Richard G. Green, *A Short History of Logistics* (Combat Operations Research Group Logistics Studies Office Staff Paper CORG–SP–222; Fort Belvoir, Va.: Combat Service Support Group, U.S. Army Combat Developments Command, 16 July 1965). Perhaps the single best known recent work on the general history of logistics is Martin L. Van Creveld's *Supplying War: Logistics from Wallenstein to Patton* (New York: Cambridge University Press, 1977). A selective discussion of the role of logistics in warfare from the eighteenth century to the present, Van Creveld's book contains a very controversial section on Allied logistics in the European Theater in World War II, which is highly recommended. Although Van Creveld frequently relies upon unsupported assertions rather than thorough understanding of the facts, the student of logistics is sure to find his accusatory prose stimulating. Something of an antidote to Van Creveld's sweeping assertions regarding Allied logistical operations in northwest Europe in 1944–1945 is provided by William Whipple, "Logistical Bottleneck," *Infantry Journal* 62, no. 3 (March 1948): 6–14 (Selection 53). Another interesting participant account of the planning and execution of Operation OVERLORD and the follow-on operations is Harold L. Mack's brief essay entitled *The Critical Error of World War II* (Washington, D.C.: National Defense University Research Directorate, 1981). Mack, the Chief Movements Officer of the European Theater of Operations in World War II, explains why the Allies outran their supply in the rapid movement to the Rhine and defends the logisticians against the libels of the "tactical wizards."

Books and articles dealing more or less exclusively with U.S. military logistics are a bit more plentiful. The most prolific logistical historian writing in the United States today is James A. Huston. His *The Sinews of War: Army Logistics, 1775–1953* (Washington, D.C.: U.S. Army Center of Military History, 1966) (Selections 30, 46, and 82) is the standard survey of all aspects of U.S. Army logistics from the Revolution through the Korean War. Huston has also written several other good books on modern American military logistics, including major studies of logistics in the Revolutionary War, in the Korean War, in the post–World War II period, and in NATO. Another key study which deals with broad periods and important topics in the history of Army logistics is James E. Hewes, Jr.'s *From Root to McNamara: Army Organization and Administration, 1900–1963* (Washington, D.C.: U.S. Army Center of Military History, 1975) (Selection 81). Hewes discusses the evolution of Army organization and management with emphasis on the influence of business management techniques. The most complete study of its kind, Hewes' book is the single best source for understanding the evolution of modern military management. David C. Rutenberg and Jane S. Allen, eds., *The Logistics of Waging War: American Logistics, 1774–1985, Emphasizing the Development of Airpower* (Gunter Air Force Station, Ala.: Air Force Logistics Management Center, 1986) is an interesting, if miscellaneous, collection of short pieces on American military logistics arranged chronologically from the Revolution to the present. Although

Rutenberg and Allen emphasize Air Force logistical matters, their book contains much for the historian of Army logistics. Another important study examines the problems of preparation and mobilization for war. Marvin A. Kreidberg and Merton G. Henry collaborated to write the *History of Military Mobilization in the United States Army, 1775–1945* (Washington, D.C.: U.S. Army Center of Military History, 1955) (Selections 11, 23, and 50), the standard history of American military mobilization. The various supply branches of the Army still await definitive general histories of their corps, but Erna Risch, a former Quartermaster Corps historian, has written *Quartermaster Support of the Army: A History of the Corps, 1775–1939* (Washington, D.C.: Quartermaster Historian's Office, Office of the Quartermaster General, 1962) covering the Quartermaster and Subsistence Departments, 1775–1939. Although very old and incomplete, the *Histories of Administrative Bureaux of the War Department* (Washington, D.C.: 1901) is still useful for the early history of the traditional supply departments.

The logistical history of American armies before the Civil War remains largely unknown despite a few excellent works such as Erna Risch's *Supplying Washington's Army* (Washington, D.C.: U.S. Army Center of Military History, 1981) (Selection 6), an excellent official study of the logistics of the Continental Army, 1775–1781. James A. Huston has also written on Army logistics in the Revolution in *Logistics of Liberty: American Services of Supply in the Revolutionary War and After* (Newark: University of Delaware Press, 1990). He covers all the bases but focuses on the problems of procurement and post–Revolutionary War armament policy. Also important is Wayne E. Carp, *To Starve the Army at Pleasure: Continental Army Administration and American Political Culture, 1775–1783* (Chapel Hill: University of North Carolina Press, 1984). Carp examines the ways in which American political beliefs, fears, assumptions, and practices affected Continental Army logistical operations and how the failure of Congress and the states to supply the army transformed the nation's political culture. Victor L. Johnson's *The Administration of the American Commissariat During the Revolutionary War* (Philadelphia: University of Pennsylvania Press, 1941) is somewhat dated but still worth reading. Johnson discusses the operations of the Commissary Department from 1775 to 1781 under Joseph Trumbull, William Buchanan, Jeremiah Wadsworth, and Ephraim Blaine. In *Logistics and the Failure of the British Army In North America, 1775–1783* (Princeton, N.J.: Princeton University Press, 1975) (Selections 4 and 9). R. Arthur Bowler provides perhaps the best general account of British logistics in the American Revolution.

The period between the Revolution and the Civil War is little studied from any perspective and good materials on Army logistics during the period are scarce. Chester L. Kieffer's *Maligned General: The Biography of Thomas S. Jesup* (Novato, Calif.: Presidio Press, 1979) provides an excellent biography of the famous "founding father of the Quartermaster Department," with emphasis on his political involvements and service in the field in the Seminole War. Francis Paul Prucha's *Broadax and Bayonet: The Role of the United States Army in the*

Development of the Northwest, 1815–1860 (Lincoln: University of Nebraska Press, 1973) (Selections 12 and 13) includes a great deal on the logistical aspects of the Army's presence in the Northwest Territory, 1815–1860. The highly acclaimed study by Merritt Roe Smith entitled *Harpers Ferry Armory and the New Technology: The Challenge of Change* (Ithaca, N.Y.: Cornell University Press, 1977) analyzes the impact of new technology on American society during this period and provides interesting insights in Army ordnance operations. Edward M. Coffman's *The Old Army: A Portrait of the American Army in Peacetime, 1784–1898* (New York: Oxford University Press, 1986) (Selection 31) contains a good deal of information on Army logistics in the nineteenth century, particularly with respect to everyday living conditions in field and garrison.

There is no logistical history of the Mexican War. Thus the interested student must wade through the mostly unpublished official documents on his own. The task is made somewhat easier by the reproduction of a great deal of official Army correspondence in *Messages of the President of the United States with the Correspondence Therewith Communicated between the Secretary of War and Other Officers of the Government on the Subject of the Mexican War,* House Executive Document no. 60, 30th Cong., 1st sess., "Mexican War Correspondence" (Washington, D.C.: Wendell & Van Benthuysen, 1848) (Selections 16–22). This collection is the Mexican War equivalent of that treasure trove of original reports and correspondence for the Civil War period, the *Official Records of the War of the Rebellion*, and it contains important and interesting primary material on logistics.

The number of books written on the Civil War probably exceeds the number written on any other topic in American history. However, the number of solid studies on logistics on either side in the War Between the States is quite small, and there have been few attempts to provide any comprehensive study which would frame Civil War–era logistics in terms pertinent to current logistical concerns. One perspective on the overall scope of Civil War logistics is Henry Granville Sharpe's prize-winning 1896 essay on "The Art of Supplying Armies in the Field as Exemplified during the Civil War," in the *Journal of the Military Service Institution of the United States* 18, no. 79 (January 1896): 45–95. Sharpe later served as both Commissary General of Subsistence and Quartermaster General. His essay is perhaps the single best short summary of logistics in the Civil War. My own brief essay on "Field Logistics in the Civil War," which was published in *The U.S. Army War College Guide to the Battle of Antietam: The Maryland Campaign of 1862*, edited by Jay Luvaas and Harold W. Nelson (Carlisle, Pa.: South Mountain Press, 1987) (Selection 24), outlines the organization for logistics of both the Union and Confederate Armies at various levels, but focuses on the support of forces in the field. The piece also includes an evaluation of the Antietam campaign of 1862 from a logistical point of view and demonstrates the influence of logistics on tactical and strategic decisions. The two classics by Bell I. Wiley, *The Life of Johnny Reb: The Common Soldier of the Confederacy* (Indianapolis, Ind.: Bobbs-Merrill, 1943) and *The Life of Billy Yank: The Common Soldier of the Union* (Indianapolis, Ind.: Bobbs-Merrill, 1952), provide interesting

and useful descriptions of the everyday life of the common soldier in the Civil War, including his clothing, food, weapons, and shelter.

War Department organization and the mobilization of the Union Army for the Civil War under Secretary of War Simon Cameron are discussed in Alexander Howard Meneely's *The War Department, 1861: A Study in Mobilization and Administration* (New York: Columbia University Press, 1928). In *Lincoln and the Tools of War* (Indianapolis, Ind.: Bobbs-Merrill Company, 1956) Robert V. Bruce outlines Northern scientific and technical advances in the Civil War and discusses Abraham Lincoln's interest in weapons and his conflict with the Chief of Ordnance, Brig. Gen. James W. Ripley. Civil War medical evacuation and treatment is succinctly covered in Louis C. Duncan's *The Medical Department of the United States Army in the Civil War* (Gaithersburg, Md.: Olde Soldier Books, 1987). Writing early in this century, Duncan, an Army Medical Corps officer, also provides a good deal of clear and detailed information on both the tactics and logistical support of the major Civil War battles. The well-known military historian Russell F. Weigley provides an excellent biography of the Union Army's Quartermaster General in *Quartermaster General of the Union Army: A Biography of M.C. Meigs* (New York: Columbia University Press, 1959).

Union Army logistical operations in the Civil War are described in three very interesting memoirs. Charles Leib's *Nine Months in the Quartermaster's Department, or The Chances for Making a Million* (Cincinnati, Ohio: Moore, Wilstach, Keys and Company, 1862) is a first-person account by a Union Army quartermaster. Another Union Army quartermaster, William G. Le Duc, served under Generals McClellan, Hooker, Sherman, and Thomas and provides an important first-person account of Quartermaster operations in the Army of the Potomac and the Army of the Tennessee in his *Recollections of a Civil War Quartermaster: The Autobiography of William G. Le Duc* (St. Paul, Minn.: The North Central Publishing Company, 1963). Henry Clay Symonds was Purchasing Commissary of Subsistence at Louisville, Kentucky, and also supported Grant and Sherman. His memoir is entitled *Report of a Commissary of Subsistence, 1861–65* (Sing Sing, N.Y.: Vireun School [published by the author], 1888). John D. Billings' *Hard Tack and Coffee, or The Unwritten Story of Army Life* (1887; reprinted, Williamstown, Mass.: Corner House Publishers, 1990), is a well-known source of interesting details on Civil War logistics and soldier life.

Confederate logistics is covered by Richard D. Goff in his *Confederate Supply* (Durham, N.C.: Duke University Press, 1969) (Selection 25). An excellent survey of Confederate supply management, Goff's book includes material on the development of the Confederate supply bureaux, the evolution of general logistical policies by the Confederate civilian leadership, and some consideration of the impact of logistical considerations on Confederate strategy. Samuel Bernard Thompson, *Confederate Purchasing Operations Abroad* (Gloucester, Mass.: Peter Smith, 1973) is a brief study of Confederate efforts to obtain supplies in Europe and Mexico focusing on the so-called New Plan, a centralized scheme for coordinating purchases and use of cotton for payments. A first-person account of how the Confederacy obtained supplies in Europe and a good description of how the block-

ade running was organized are contained in Caleb Huse's *The Supplies for the Confederate Army: How They Were Obtained in Europe and How Paid For—Personal Reminiscences and Unpublished History* (Boston: T. R. Marvin & Son, 1904). Frank E. Vandiver has written an important study of the Confederate Chief of Ordnance entitled *Ploughshares into Swords: Josiah Gorgas and Confederate Ordnance* (Austin: University of Texas Press, 1952) and has also edited Gorgas' diary in *The Civil War Diary of General Josiah Gorgas* (University: University of Alabama Press, 1947).

Railroads assumed great logistical importance in the Civil War, and there are many studies of Civil War railroad operations. George B. Turner's *Victory Rode the Rails: The Strategic Place of the Railroads in the Civil War* (Indianapolis, Ind.: Bobbs-Merrill, 1953) is an important study of the strategic importance of railroads in the Civil War. The official account of the organization, equipment, and operations of Union military railroads in the Civil War is contained in United States Military Railroad Department, *United States Military Railroads* (Washington, D.C.: Government Printing Office, 1866). Thomas Weber's *The Northern Railroads in the Civil War, 1861–1865* (New York: King's Crown, 1952), is also quite valuable. Brig. Gen. Herman Haupt played a key role in building, maintaining, and operating Union Army railroads. Haupt has been the subject of two good biographies: Francis A. Lord, *Lincoln's Railroad Man: Herman Haupt* (Rutherford, N.J.: Fairleigh Dickinson University Press, 1969), and James A. Ward, *That Man Haupt: A Biography of Herman Haupt* (Baton Rouge: Louisiana State University Press, 1973). Haupt's own account, *Reminiscences of General Herman Haupt, Chief of the Bureau of United States Military Railroads in the Civil War*, edited by Frank A. Flower (Milwaukee, Wis.: Wright and Joys, 1901), is excellent for all aspects of Union military railroad construction and operations. Robert C. Black III describes Confederate railroad policy and operations in *The Railroads of the Confederacy* (Wilmington, N.C.: Broadfoot Publishing Company, 1987), and another perspective is provided by Jeffrey N. Lash in *Destroyer of the Iron Horse: Joseph E. Johnston and Confederate Rail Transport, 1861–1865* (Kent, Ohio: Kent State University Press, 1991). Lash describes serious deficiencies in logistical competence on the part of several high-ranking Confederate officers and argues that Johnston failed to use the railroads effectively and is overrated both as a strategist and as a logistician.

Of course, the serious student of Civil War logistics must in the end rely on the *OR* and the annual reports of the Secretary of War, Commanding General of the Army, and the chiefs of the various supply bureaus (the Quartermaster General, Commissary General of Subsistence, Chief of Ordnance, and Surgeon General). The reports of the various field commanders included with the reports of the Secretary of War are also quite useful, not only for the Civil War period but for earlier and later periods as well. The annual reports often contain succinct descriptions of logistical activities. The *OR*, the full title of which is *The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies,* 128 vols. (Washington, D.C.: Government Printing Office, 1880–1901), on the other hand, is a collection of documents which requires some time and dedication to peruse.

There are several hundred books on George Armstrong Custer and the Battle of the Little Bighorn in June 1876, but a good logistical history of the Indian-fighting army remains to be written. The most comprehensive attempt so far is the 1968 Washington State University master's thesis of William Morris Hoge, Jr., entitled *The Logistical System of the U.S. Army during the Indian Wars, 1866–1889.* Hoge describes the logistical aspects of the Army's campaigns against the Plains Indians and devotes one chapter each to supply, transportation, maintenance, communications, construction, and hospitalization. He also asserts that the failure to provide more effective logistical organization reduced the combat strength of the Army and prolonged the Indian Wars unnecessarily. One of the more informative studies is Darlis A. Miller's *Soldiers and Settlers: Military Supply in the Southwest, 1861–1885* (Albuquerque: University of New Mexico Press, 1989). Miller analyzes the role of Army supply contracts in the development of the economy of the Southwest and includes chapters on agriculture, forage and fuel, flour and other commissary supplies, cattle industry, construction, civilian employees, and transportation. Perhaps the best study of soldier life, including rations, clothing, and other logistical details, during the Indian War era is Don Rickey, Jr.'s *Forty Miles a Day on Beans and Hay: The Enlisted Soldier Fighting the Indian Wars* (Norman: University of Oklahoma Press, 1977). Samuel B. Holabird, "Army Wagon Transportation," *Journal of the Military Service Institution of the United States* 3, no. 9 (1882):97–126, is an excellent contemporary review of principles and practices by the Assistant Quartermaster General using examples from the Civil War but composed as a didactic piece for Indian War quartermasters. Memoirs from this period are relatively plentiful and among the best is Thomas Cruse's *Apache Days and After* (Caldwell, Idaho: The Caxton Printers, Ltd., 1941). Cruse retired as a brigadier general of the Quartermaster Department in 1918. His lively memoir includes excellent sketches of Army life and of famous soldiers in their early days, particularly key figures in the Quartermaster Department.

The literature on military logistics during and after the Spanish-American War of 1898 is copious. The basic source of information on all Spanish-American War logistical matters is the official report prepared by the presidential commission (commonly known as the Dodge Commission) appointed to investigate the War Department's management of the War with Spain. The eight volumes of *The Report of the Commission Appointed by the President to Investigate the Conduct of the War Department in the War with Spain,* Senate Document no. 221, 56th Cong., 1st sess. (Washington, D.C.: Government Printing Office, 1900) (Selection 34) are surprisingly readable. Also excellent is Graham A. Cosmas' *An Army for Empire: The United States Army in the Spanish-American War,* 2d ed. (Shippensburg, Pa.; White Mane Publishing Company, 1994) (Selection 33) which examines Army preparedness in 1898 and concludes that the greatest difficulties arose from the too rapid mobilization, lack of support personnel, and long-standing problems of Army organization and coordination. The discredited Secretary of War Russell Alger maintained that the Army's lack of preparedness was due in part to underfunding by the Congress and that no change in organiza-

tion was needed, simply better support of the existing structure. His defensive discussion of Army preparations and operations in the War with Spain is contained in *The Spanish-American War* (New York: Harper and Brothers Publishers, 1901). Theodore Roosevelt was a severe critic of Army logistical arrangements in 1898 and some of his more acerbic comments about the Tampa embarkation and operations in Cuba are contained in his well-known book entitled *The Rough Riders* (New York: Charles Scribner's Sons, 1899).

The best introduction to the reforms precipitated by logistical failures in the War with Spain is Secretary of War Elihu Root's own *The Military and Colonial Policy of the United States: Addresses and Reports*, collected and edited by Robert Bacon and James Brown Scott (Cambridge, Mass.: Harvard University Press, 1916) (Selection 40), which contains Root's testimony before Congress and a great deal of other material on the efficiency of the Army, the reorganization of the staff bureaux and the creation of a General Staff, and other topics related to Army logistics. Also important is United States House of Representatives, *The National Defense: Hearings Before the Committee on Military Affairs, House of Representatives, Sixty-Ninth Congress, Second Session (Historical Documents Relating to the Reorganization Plans of the War Department and to the Present National Defense Act), Part 1* (Washington, D.C.: Government Printing Office, 1927), a collection of documents, primarily testimony before Congress, relating to the Root reforms and other efforts to reorganize the Army in the early twentieth century. It includes particularly important statements by Secretary Root before the House Committee on Military Affairs in 1902.

World War I has not been neglected, particularly with respect to the important topic of industrial mobilization and the production of war materiel. One of the more important works is Benedict Crowell's *America's Munitions, 1917–1918* (Washington, D.C.: Government Printing Office, 1919) (Selection 44). Crowell was the Assistant Secretary of War and Director of Munitions, and his firsthand account of America's armaments production in World War I includes extensive production statistics and detailed descriptions of the problems faced. Crowell also cooperated with Robert F. Wilson on *How America Went to War* (New Haven, Conn.: Yale University Press, 1921), a somewhat inaccurate insider's view of America's industrial mobilization and demobilization for World War I which includes some material on supply and transportation of the AEF in France. Bernard Baruch was head of the War Industries Board in World War I and an important figure in American mobilization for both World War I and World War II. A good biography of Baruch is Margaret Coit's *Mr. Baruch* (Boston: Houghton Mifflin, 1957). Baruch himself was a prolific writer. He produced an autobiography, *Baruch: The Public Years* (New York: Holt, Rinehart, and Winston, 1960), as well as a ghostwritten account of the operation of the War Industries Board in World War I entitled *American Industry in the War: A Report of the War Industries Board* (New York: Prentice-Hall, 1941). *The Quartermaster Corps in the Year 1917 in the World War* (New York: The Century Company, 1921) is a detailed *apologia* by the discredited World War I Quartermaster General, Henry Granville Sharpe, and focuses on the problems of supplying the Army in the early days of the war.

Edward N. Hurley was Chairman of the U.S. Shipping Board in World War I. In *The Bridge to France* (Philadelphia: J. B. Lippincott, 1927) he tells of the effort to build ships and move men and supplies to the AEF in France in World War I. Another perspective on the enormous effort to move troops and supplies to France is provided in David Carey Shanks' *As They Passed Through the Port* (Washington, D.C.: The Cary Publishing Company, 1927), the memoir of the commander of the Hoboken, New Jersey, Port of Embarkation, the principal POE for troops shipping to France, in World War I. Information on transportation activities in France in World War I is provided by William J. Wilgus in *Transporting the A.E.F. in Western Europe, 1917–1919* (New York: Columbia University Press, 1931). Wilgus was the Director of Military Railways and Deputy Director General of Transportation for the AEF.

American logistical operations in France are neatly outlined in United States War Department General Staff, War Plans Division, Historical Branch, *Organization of the Services of Supply, AEF,* Monograph no. 7 (Washington, D.C.: Government Printing Office, 1921). Also useful is Johnson Hagood's *The Services of Supply: A Memoir of the Great War* (Boston: Houghton Mifflin, 1927). Hagood was Chief of Staff, Services of Supply, American Expeditionary Forces, and his memoir is crucial to any study of logistics in the AEF. So too are the several books by Maj. Gen. James G. Harbord, who served as AEF Chief of Staff (1917–1918) and Commander of the Services of Supply (1918). Perhaps the best is his *The American Army in France, 1917–1919* (Boston: Little, Brown and Company, 1936), a personal account which includes a good deal of important information on logistical organization and operations in the AEF as well as other aspects of U.S. participation in World War I.

Another important firsthand account is the two-volume memoir of Charles G. Dawes entitled *A Journal of the Great War* (Boston: Houghton Mifflin, 1921). Later to become Vice President of the United States, Dawes was General Purchasing Agent for the AEF and played a key role in coordinating American logistical requirements with the Allies. For a systematic detailed study of Allied logistical activities one should consult the well-documented official study prepared by the Allied Armies under Marshal Foch in the Franco-Belgian Theater of Operations and entitled *Report of the Military Board of Allied Supply,* 2 vols. (Washington, D.C.: Government Printing Office, 1924–1925) (Selection 47). I have been able to add a little to the story of World War I Allied logistical cooperation in "'Maconochie's Stew': Logistical Support of American Forces with the BEF, 1917–1918," in *The Great War, 1914–18: Essays on the Military, Political and Social History of the First World War*, edited by R.J.Q. Adams (College Station: Texas A & M University Press, 1990), which addresses such topics of current interest as "interoperability" and "host nation support."

The history of Army logistics in the Second World War is thoroughly documented, and the published works in the field are dominated by the impressive volumes produced by the U.S. Army Center of Military History and commonly called "the Green Books." Many of these detailed official histories address logistical matters. For example, the activities of Army Service Forces are described by

John D. Millett in *The Organization and Role of Army Service Forces* (Washington, D.C.: U.S. Army Center of Military History, 1954). The organization and operations of the technical services (Quartermaster, Ordnance, and Transportation Corps) are treated in multiple volumes in the "Technical Services" subseries. The three principal exemplars of the technical services histories are Erna Risch, *The Quartermaster Corps: Organization, Supply, and Services*, 2 vols. (Washington, D.C.: U.S. Army Center of Military History, 1953 and 1955); Chester Wardlow, *The Transportation Corps: Responsibilities, Organization, and Operations* (Washington, D.C.: U.S. Army Center of Military History, 1951); and Lida Mayo, *The Ordnance Department: Of Beachhead and Battlefront* (Washington, D.C.: U.S. Army Center of Military History, 1968). The measures taken to prepare the Army for World War II at the level of the Chief of Staff are covered in Mark S. Watson's *Chief of Staff: Prewar Plans and Preparations* (Washington, D.C.: U.S. Army Center of Military History, 1950). Perhaps the most important books of the entire series are the two volumes written by Robert W. Coakley and Richard M. Leighton, *Global Logistics and Strategy, 1940–1943* (Washington, D.C.: U.S. Army Center of Military History, 1955) (Selection 1) and *Global Logistics and Strategy, 1943–1945* (Washington, D.C.: U.S. Army Center of Military History, 1969) are indispensable sources for World War II logistical activities as seen from the highest levels. Logistical operations in the key European Theater (as well as North Africa) are covered in Roland G. Ruppenthal's two-volume *Logistical Support of the Armies* (Washington, D.C.: U.S. Army Center of Military History, 1953 and 1959). Other "Green Books" address such important topics as Lend-Lease support of the Soviet Union through the Persian Gulf, the mobilization and use of industrial manpower, and rearming the French. In addition, the other volumes in the series, which focus on strategy and combat operations, also include excellent coverage of related logistical operations. The well-known official history volume, *Command Decisions* (Washington, D.C.: U.S. Army Center of Military History, 1959), edited by Kent Roberts Greenfield, contains twenty excellent essays on various key decisions in World War II including some logistical ones.

There are many other interesting and important works on World War II Army logistics aside from the official history volumes. Perhaps the best overall summary of Army logistical activities in World War II is to be found in the final official report of Army Service Forces, *Logistics in World War II* (Washington, D.C.: Government Printing Office, 1948) (Selections 52 and 58). An excellent review of the activities of Army Service Forces in World War II, this narrative report includes a good deal of information on the impact of logistics on strategy as well as useful statistical information. First published in Paris in 1945 by the Historical Section, European Theater, under the title *American Enterprise in Europe*, Randolph Leigh's *48 Million Tons to Eisenhower: The Role of the SOS in the Defeat of Germany* (Washington, D.C.: The Infantry Journal Press, 1945) (Selection 55), is an anecdotal but interesting statistical and narrative summary of the activities of the Services of Supply in the European Theater during the D-Day landings and the immediate post–D-Day period by a contemporary Army histori-

an. A former Army Chief Historian, Kent Roberts Greenfield, published a little book entitled *The Historian and the Army* (New Brunswick, N.J.: Rutgers University Press, 1954) containing a chapter, "The Army Re-Shaped," which deals with the very important topic of how logistical demands influenced the force structure of the Army in World War II. Col. H. F. Sykes, Jr., also examines the interrelationship of logistics, force structure, and strategy in World War II, with special emphasis on the limitations placed on strategy by a nation's industrial production capacity and manpower in "Logistics and World War II Army Strategy," in *Military Review* 35, no. 2 (February 1956):47–54 (Selection 51). Another excellent monograph on the planning of Army force structure in World War II is provided by Army historian Charles E. Kirkpatrick in *An Unknown Future and a Doubtful Present: Writing the Victory Plan of 1941* (Washington, D.C.: U.S. Army Center of Military History, 1990). American industrial mobilization and war production achievements in World War II are described by the head of the wartime War Production Board, Donald M. Nelson, in *Arsenal of Democracy: The Story of American War Production* (New York: Harcourt, Brace, 1946). John Russell Reese's *Supply Man: The Army Life of Lieutenant General Henry S. Aurand, 1915–1952* (Manhattan: Kansas State University Press, 1984), is the biography of an Army officer who made major contributions to development of Army field supply doctrine and techniques in the interwar years and World War II.

Post–World War II Army logistics have not been totally ignored, although much work remains to be done. James A. Huston's *Outposts and Allies: U.S. Army Logistics in the Cold War, 1945–1953* (Selinsgrove, Pa.: Susquehanna University Press, 1988) is quite good, as is the same author's *One for All: The United States and International Logistics Through the Formative Period of NATO (1949–1969)* (Newark: University of Delaware Press, 1984). Two recently published memoirs by key postwar Army logisticians are particularly recommended. Joseph M. Heiser, Jr.'s *A Soldier Supporting Soldiers* (Washington, D.C.: U.S. Army Center of Military History, 1991) is a very interesting memoir by one of the more important Army logisticians of the post–World War II period, and Carter B. Magruder's *Recurring Logistic Problems As I Have Observed Them* (Washington, D.C.: U.S. Army Center of Military History, 1991), presents lessons learned from World War II through the Korean War by another leading Army logistician of the period.

James A. Huston's *Guns and Butter, Powder and Rice: U.S. Army Logistics in the Korean War* (Selinsgrove, Pa.: Susquehanna University Press, 1989) contains a brief discussion of North Korean/Chinese logistics and an excellent bibliography. John G. Westover provides an interesting collection of firsthand narratives of combat service support operations during the Korean War in *Combat Support in Korea* (Washington, D.C.: U.S. Army Center of Military History, 1986) (Selections 62–67).

Readers interested in the Vietnam War can consult Lt. Gen. Joseph M. Heiser, Jr.'s *Logistic Support* (Washington, D.C.: Government Printing Office, 1974) (Selections 69 and 70), a participant monograph on logistic support of the Army in Vietnam, 1965–1971. The more aggressive student can attack the multi-volume report of the Joint Logistics Review Board established by the Deputy Secretary of

Defense on 17 February 1969 to review worldwide logistic support to U.S. combat forces during the Vietnam era. Entitled *Logistic Support in the Vietnam Era* (Washington, D.C.: Office of the Assistant Secretary of Defense [Installations and Logistics], 1970) (Selection 73), the report identifies strengths and weaknesses and recommends appropriate improvements in military logistics based on the lessons of the Vietnam War. More recent U.S. military operations such as the interventions in Lebanon, Grenada, and Panama and the recent Gulf War have not yet received definitive study as regards the logistical operations involved, but new works on contemporary logistical history are appearing every day and it is to be hoped that excellent studies will be produced. One early entry in the race is Gary H. Wade, *Rapid Deployment Logistics: Lebanon, 1958,* CSI Research Survey no. 3 (Fort Leavenworth, Kans.: Combat Studies Institute, U.S. Army Command and General Staff College, October 1984) (Selection 75).

Although the history of U.S. Army logistics is less well covered in published sources than some other topics in military history, there is no shortage of interesting, informative, and even provocative material for the reader seeking to improve his or her grasp of military operations in the modern era. The serious student of the history of U.S. Army logistics can easily devise a personal reading program including all or part of the books and articles included in the foregoing list. The raw materials are there; it only remains for the interested reader to find and devour them. The result will surely be a more comprehensive and concrete understanding of modern military affairs.

Appendix A

Key Logistical Personalities, 1775–1991

The Quartermasters General

Col. Thomas Mifflin	14 Aug 1775	16 May 1776
Col. Stephen Moylan	5 Jun 1776	27 Sep 1776
Maj. Gen. Thomas Mifflin	28 Sep 1776	7 Nov 1777
Maj. Gen. Nathanael Greene	2 Mar 1778	26 Jul 1780
Col. Timothy Pickering	5 Aug 1780	25 Jul 1785
Samuel Hodgdon	4 Mar 1791	19 Apr 1792
James O'Hara	19 Apr 1792	30 May 1796
Maj. Gen. John Wilkins, Jr.	1 Jun 1796	16 Mar 1802
Brig. Gen. Morgan Lewis	4 Apr 1812	2 Mar 1813
Brig. Gen. Robert Swarthout	21 Mar 1813	29 Apr 1816
Col. James R. Mullaney (No. Div.)	29 Apr 1816	4 Apr 1818
Col. George Gibson (So. Div.)	29 Apr 1816	14 Apr 1818
Brig. Gen. Thomas Sidney Jesup	8 May 1818	10 Jun 1860
Brig. Gen. Joseph Eggleston Johnston	28 Jun 1860	22 Apr 1861
Brig. Gen. Montgomery C. Meigs	15 May 1861	6 Feb 1882
Brig. Gen. Daniel H. Rucker	13 Feb 1882	23 Feb 1882
Brig. Gen. Rufus Ingalls	23 Feb 1882	1 Jul 1883
Brig. Gen. Samuel B. Holabird	1 Jul 1883	16 Jun 1890
Brig. Gen. Richard N. Batchelder	26 Jun 1890	27 Jul 1896
Brig. Gen. Charles G. Sawtelle	9 Aug 1896	16 Feb 1897
Brig. Gen. George H. Weeks	16 Feb 1897	3 Feb 1898
Brig. Gen. Marshall I. Ludington	3 Feb 1898	12 Apr 1903
Brig. Gen. Charles F. Humphrey	13 Apr 1903	30 Jun 1907
Brig. Gen. James B. Aleshire	1 Jul 1907	2 Sep 1916
Maj. Gen. Henry Granville Sharpe	13 Sep 1916	12 Jul 1918
Maj. Gen. George W. Goethals (acting)	20 Dec 1917	9 May 1918
Brig. Gen. Robert E. Wood (acting)	10 May 1918	12 Feb 1919
Maj. Gen. Harry L. Rogers	22 Jul 1918	27 Aug 1922
Maj. Gen. William H. Hart	28 Aug 1922	2 Jan 1926
Maj. Gen. B. Frank Cheatham	3 Jan 1926	17 Jan 1930
Maj. Gen. John L. DeWitt	3 Feb 1930	2 Feb 1934
Maj. Gen. Louis H. Bash	3 Feb 1934	31 Mar 1936
Maj. Gen. Henry Gibbins	1 Apr 1936	31 Mar 1940
Lt. Gen. Edmund B. Gregory	1 Apr 1940	31 Jan 1946
Maj. Gen. Thomas B. Larkin	1 Feb 1946	20 Mar 1949

Maj. Gen. Herman Feldman	21 Mar 1949	30 Sep 1951
Maj. Gen. George A. Horkan	9 Oct 1951	31 Jan 1954
Maj. Gen. Kester L. Hastings	5 Feb 1954	31 Mar 1957
Maj. Gen. Andrew T. McNamara	12 Jun 1957	11 Jun 1961
Maj. Gen. Webster Anderson	12 Jun 1961	31 Jul 1962

The Office of the Quartermaster General was abolished on 31 July 1962, but was reestablished in 1983 as the proponent agency for all Quartermaster Corps-related matters.

Maj. Gen. Harry L. Dukes, Jr.	16 Jul 1981	29 Mar 1984
Maj. Gen. Eugene L. Stillions, Jr.	29 Mar 1984	15 Jun 1987
Maj. Gen. William T. McLean	15 Jun 1987	14 Jul 1989
Maj. Gen. Paul J. Vanderploog	14 Jul 1989	4 Jun 1991
Brig. Gen. John J. Cusick	24 Jul 1991	

The Chiefs of Ordnance

The Commissaries of Artillery Stores		
Ezekiel Cheever	17 Aug 1775	1 Dec 1775
Col. Benjamin Flower (for Flying Camp)	16 Jul 1776	1 Dec 1776
Maj. Samuel French	18 Jan 1777	30 Apr 1778
Maj. George Peale		1 Feb 1777
Maj. Jonathan Gostelaw		1 Feb 1777
Maj. Joseph Watkins		5 Feb 1777
Maj. Charles Lukens	8 Mar 1777	30 Aug 1780
Maj. Richard Frothingham	17 Sep 1782	3 Nov 1783
Inspector General of Ordnance and Military Fortifications		
Maj. Gen. P.C.J.B.T. du Coudray	11 Aug 1777	15 Sep 1777
The Commissaries-General of Military Stores		
Col. Benjamin Flower	16 Jul 1776	28 Apr 1781
Col. Samuel Hodgdon	12 Jul 1781	20 Jun 1784
The Commissary-General of Ordnance		
Col. Decius Wadsworth	2 Jul 1812	8 Feb 1815
The Chiefs of Ordnance		
Col. Decius Wadsworth	8 Feb 1815	1 Jun 1821

The Ordnance Department was merged with the Artillery in 1821, but was reestablished in 1832.

Col. George Bomford	30 May 1832	25 Mar 1848
Col. George Talcott	25 Mar 1848	10 Jul 1851
Col. Henry K. Craig	10 Jul 1851	23 Apr 1861

Brig. Gen. James W. Ripley	23 Apr 1861	15 Sep1863
Brig. Gen. George D. Ramsay	15 Sep 1863	12 Sep 1864
Brig. Gen. Alexander B. Dye	12 Sep 1864	20 May 1874
Brig. Gen. Stephen Vincent Benét	23 Jun 1874	22 Jan 1891
Brig. Gen. Daniel W. Flagler	23 Jan 1891	29 Mar 1899
Brig. Gen. Adelbert R. Buffington	5 Apr 1899	21 Nov 1901
Maj. Gen. William Crozier	22 Nov 1901	15 Jul 1918
Maj. Gen. Clarence C. Williams	16 Jul 1918	1 Apr 1930
Maj. Gen. Samuel Hof	2 Jun 1930	1 Jun 1934
Maj. Gen. William H. Tschappat	2 Jun 1934	2 Jun 1938
Maj. Gen. Charles M. Wesson	3 Jun 1938	31 May 1942
Lt. Gen. Levin H. Campbell, Jr.	1 Jun 1942	31 May 1946
Maj. Gen. Everett S. Hughes	1 Jun 1946	31 Oct 1949
Maj. Gen. Elbert L. Ford	1 Nov 1949	31 Oct 1953
Lt. Gen. Emerson L. Cummings	2 Nov 1953	7 Feb 1958
Lt. Gen. John H. Hinrichs	8 Feb 1958	31 May 1962
Maj. Gen. Horace F. Bigelow	1 Jun 1962	31 Jul 1962

The Office of the Chief of Ordnance was abolished on 31 July 1962, but was reestablished in 1983 as the proponent agency for all Ordnance Corps-related matters.

Brig. Gen. Jackson E. Rozier(provisional)	20 Mar 1981	10 Nov 1983
Maj. Gen. William E. Potts	10 Nov 1983	13 Jun 1986
Maj. Gen. Leon E. Salomon	13 Jun 1986	11 Aug 1988
Maj. Gen. James W. Ball	12 Aug 1988	13 Jul 1990
Brig. Gen. Johnnie E. Wilson	13 Jul 1990	

The Commissaries General of Subsistence

The Commissary General of Stores and Provisions		
Joseph Trumbull	19 Jul 1775	2 Aug 1777
The Commissary General of Issues		
Charles Stewart	18 Jun 1777	24 Jul 1782
The Commissaries General of Purchases		
William Buchanan	5 Aug 1777	9 Apr 1778
Jeremiah Wadsworth	9 Apr 1778	1 Jan 1780
Ephraim Blaine	1 Jan 1780	30 Nov 1780

From 1780 to 1818 the purchase and issue of subsistence was by contract supervised by the Treasury Department and there was no uniformed officer in charge.

The Commissaries of Purchases		
Callender Irvine	8 Aug 1812	9 Oct 1841
J. W. Tyson	11 Oct 1841	22 Apr 1842

The Commissaries General of Subsistence

Maj. Gen. George Gibson	1 8 Apr 1818	29 Sep 1861
Brig. Gen. Joseph P. Taylor	29 Sep 1861	29 Jun 1864
Brig. Gen. Amos B. Eaton	29 Jun 1864	1 6 Feb 1874
Brig. Gen. Alexander E. Shiras	1 6 Feb 1874	14 Apr 1875
Brig. Gen. Robert Macfeely	1 4 Apr 1875	1 Jul 1890
Brig. Gen. Beekman Du Barry	1 Jul 1890	22 Dec 1892
Brig. Gen. John P. Hawkins	22 Dec 1892	29 Sep 1894
Brig. Gen. M. R. Morgan	8 Oct 1894	18 Jan 1897
Brig. Gen. T. C. Sullivan	18 Jan 1897	14 Nov 1897
Brig. Gen. W. H. Bell	14 Nov 1897	28 Jan 1898
Brig. Gen. S. T. Cushing	28 Jan 1898	21 Apr 1898
Brig. Gen. W. H. Nash	21 Apr 1898	2 May 1898
Brig. Gen. Charles P. Eagan	3 May 1898	6 Dec 1900
Brig. Gen. James F. Weston	6 Dec 1900	12 Oct 1905
Brig. Gen. Henry Granville Sharpe	12 Oct 1905	24 Aug 1912

The Subsistence Department was merged with the Quartermaster and Pay Departments in August 1912 and the Office of Commissary General of Subsistence was abolished

The Chiefs of Transportation

Maj. Gen. Charles P. Gross	31 Jul 1942	30 Nov 1945
Maj. Gen. Edmund H. Leavey	1 Dec 1945	10 Jun 1948
Maj. Gen. Frank A. Heileman	11 Jun 1948	31 Mar 1953
Maj. Gen. Paul F. Yount	1 Apr 1953	31 Jan 1958
Maj. Gen. Frank S. Besson	17 Mar 1958	25 Mar 1962
Maj. Gen. Rush B. Lincoln, Jr.	26 Mar 1962	23 Jun 1963
Maj. Gen. Edward W. Sawyer	26 Jun 1963	31 Jul 1964
Col. Richard K. Hutson	1 Aug 1964	14 Sep 1964
Maj. Gen. William H. Redling	15 Sep 1964	14 Dec 1964

The Office of the Chief of Transportation was abolished in 1964, but was reestablished in 1983 as the proponent agency for all Transportation Corps-related personnel matters.

Maj. Gen. Harold I. Small	1 Jun 1983	29 Jun 1983
Maj. Gen. Aaron L. Lilley	30 Jun 1983	8 Aug 1985
Maj. Gen. Fred E. Elam	9 Aug 1985	25 Apr 1988
Maj. Gen. Samuel N. Wakefield	26 Apr 1988	

The Senior Logisticians on the Army Staff

The Director, Storage and Traffic Division

Maj. Gen. George Washington Goethals	28 Dec 1917	15 Apr 1918

The Directors, Purchase and Supply Division

Brig. Gen. Palmer E. Pierce	9 Feb 1918	16 Apr 1918

Brig. Gen. Hugh S. Johnson	16 Apr 1918	31 Aug 1918
Brig. Gen. Robert E. Wood	12 Sep 1918	12 Feb 1919
The Director, Purchase, Storage and Traffic Division		
Maj. Gen. George Washington Goethals	16 Apr 1918	28 Feb 1919
Maj. Gen. George W. Burr	1 Mar 1919	11 Aug 1920
Maj. Gen. William M. Wright	1 Sep 1920	30 Jun 1921
The Director, Supply Division		
Maj. Gen. James G. Harbord	1 Jul 1921	31 Aug 1921
The Assistant Chiefs of Staff, G–4		
Brig. Gen. William D. Connor	1 Sep 1921	9 Nov 1922
Brig. Gen. Stuart Heintzelman	10 Nov 1922	30 Nov 1923
Brig. Gen. Denis E. Nolan	1 Dec 1923	13 Sep 1924
Maj. Gen. Fox Connor	1 Dec 1924	8 Mar 1926
Brig. Gen. Briant H. Wells	9 Mar 1926	30 Apr 1927
Brig. Gen. Ewing E. Booth	1 May 1927	11 Oct 1930
Brig. Gen. Robert E. Callan	19 Jan 1931	18 Jan 1935
Brig. Gen. Charles S. Lincoln	13 Feb 1935	31 May 1936
Brig. Gen. George R. Spalding	1 Jun 1936	15 Apr 1937
Brig. Gen. George P. Tyner	16 Apr 1937	20 Jan 1940
Brig. Gen. Richard C. Moore	21 Jan 1940	20 Jul 1940
Col. Eugene Reybold (acting)	4 Aug 1940	8 Sep 1941
Brig. Gen. Brehon B. Somervell	25 Nov 1941	8 Mar 1942
Brig. Gen. Raymond G. Moses	9 Mar 1942	1 Sep 1943
Maj. Gen. Russell L. Maxwell	30 Sep 1943	14 Mar 1946
Maj. Gen. Stanley L. Scott (acting)	15 Mar 1946	9 Jun 1946
The Directors of Service, Supply, and Procurement		
Lt. Gen. LeRoy Lutes	11 Jun 1946	4 Jan 1948
Lt. Gen. Henry S. Aurand	5 Jan 1948	14 Nov 1948
The Directors of Logistics		
Lt. Gen. Henry S. Aurand	15 Nov 1948	20 Mar 1949
Lt. Gen. Thomas B. Larkin	21 Mar 1949	28 Feb 1950
The Assistant Chiefs of Staff, G–4, Logistics		
Lt. Gen. Thomas B. Larkin	1 Mar 1950	20 Dec 1952
Lt. Gen. Williston B. Palmer	21 Dec 1952	7 Sep 1954
The Deputy Chiefs of Staff for Logistics		
Lt. Gen. Williston B. Palmer	8 Sep 1954	30 Apr 1955
Lt. Gen. Carter B. Magruder	1 May 1955	16 Jul 1959
Lt. Gen. Robert W. Colglazier, Jr.	17 Jul 1959	31 Jul 1964

Lt. Gen. Lawrence J. Lincoln	1 Aug 1964	Jun 1967
Lt. Gen. Jean E. Engler	Jul 1967	31 Aug 1969
Lt. Gen. Joseph M. Heiser, Jr.	1 Sep 1969	Nov 1972
Lt. Gen. Fred Kornet, Jr.	Dec 1972	31 Aug 1975
Lt. Gen. Jack C. Fuson	2 Sep 1975	31 Jul 1977
Lt. Gen. Elvind H. Johansen	1 Aug 1977	31 May 1979
Lt. Gen. Arthur J. Gregg	1979	1981
Lt. Gen. Richard H. Thompson	1981	1984
Lt. Gen. Benjamin F. Register, Jr.	1984	Jun 1987
Lt. Gen. Jimmy D. Ross	Jul 1987	30 Jan 1992
Lt. Gen. Leon E. Salomon	31 Jan 1992	

The Commanders, Army Service Forces

Lt. Gen. Brehon B. Somervell	9 Mar 1942	31 Dec 1945
Lt. Gen. LeRoy Lutes	1 Jan 1946	9 Jun 1946

The Commanders, United States Army Materiel Command

General Frank S. Besson	1 Aug 1962	9 Mar 1969
General Ferdinand J. Chesarek	10 Mar 1969	31 Oct 1970
General Henry A. Miley, Jr.	1 Nov 1970	7 Feb 1975
Lt. Gen. Woodrow W. Vaughan (acting)	8 Feb 1975	11 Feb 1975
General John R. Deane, Jr.	12 Feb 1975	31 Jan 1977
Lt. Gen. George Sammet, Jr.	1 Feb 1977	17 May 1977
General John R. Guthrie	18 May 1977	7 Sep 1980
Lt. Gen. Harold Hardin (acting)	8 Sep 1980	19 Sep 1980
General John R. Guthrie	20 Sep 1980	31 Aug 1981
General Donald R. Keith	31 Aug 1981	28 Jun 1984
General Richard H. Thompson	29 Jun 1984	13 Apr 1987
General Louis C. Wagner, Jr	14 Apr 1987	26 Sep 1989
General William G. T. Tuttle, Jr.	27 Sep 1989	30 Jan 1992
General Jimmy D. Ross	31 Jan 1992	

Appendix B

Expenditures of the Army, 1775–1991

Year	Expenditure ($)	Year	Expenditure ($)
1775–88	Not available	1820	2,630,000
1789–91	633,000	1821	4,461,000
1792	1,101,000	1822	3,112,000
1793	1,130,000	1823	3,097,000
1794	2,639,000	1824	3,341,000
1795	2,481,000	1825	3,660,000
1796	1,260,000	1826	3,943,000
1797	1,039,000	1827	3,939,000
1798	2,010,000	1828	4,146,000
1799	2,467,000	1829	4,724,000
1800	2,561,000	1830	4,767,000
1801	1,673,000	1831	4,842,000
1802	1,179,000	1832	5,446,000
1803	822,000	1833	6,704,000
1804	875,000	1834	5,696,000
1805	713,000	1835	5,759,000
1806	1,224,000	1836	12,169,000
1807	1,289,000	1837	13,683,000
1808	2,901,000	1838	12,897,000
1809	3,346,000	1839	8,917,000
1810	2,294,000	1840	7,097,000
1811	2,033,000	1841	8,806,000
1812	11,818,000	1842	6,612,000
1813	19,652,000	1843	2,957,000
1814	20,351,000	1844	5,179,000
1815	14,794,000	1845	5,753,000
1816	16,012,000	1846	10,793,000
1817	8,004,000	1847	38,306,000
1818	5,623,000	1848	25,502,000
1819	6,506,000	1849	14,853,000

Year	Expenditure ($)	Year	Expenditure ($)
1850	9,400,000	1885	42,671,000
1851	11,812,000	1886	34,324,000
1852	8,225,000	1887	38,561,000
1853	9,947,000	1888	38,522,000
1854	11,734,000	1889	44,435,000
1855	14,774,000	1890	44,583,000
1856	16,948,000	1891	48,720,000
1857	19,262,000	1892	46,895,000
1858	25,485,000	1893	49,642,000
1859	23,244,000	1894	54,568,000
1860	16,409,767	1895	51,805,000
1861	22,981,150	1896	50,831,000
1862	394,368,407	1897	48,950,000
1863	599,298,601	1898	91,992,000
1864	690,791,643	1899	229,841,000
1865	1,031,323,000	1900	134,775,000
1866	284,450,000	1901	144,616,000
1867	95,224,000	1902	112,272,000
1868	123,247,000	1903	118,630,000
1869	78,502,000	1904	165,200,000
1870	57,656,000	1905	126,094,000
1871	35,800,000	1906	137,326,000
1872	35,372,000	1907	149,775,000
1873	46,323,000	1908	175,840,000
1874	42,314,000	1909	192,487,000
1875	41,121,000	1910	189,823,000
1876	38,071,000	1911	197,199,000
1877	37,083,000	1912	184,123,000
1878	32,154,000	1913	202,129,000
1879	40,426,000	1914	208,349,000
1880	38,177,000	1915	202,060,000
1881	40,466,000	1916	183,176,000
1882	43,570,000	1917	377,941,000
1883	48,911,000	1918	4,869,955,000
1884	39,430,000	1919	9,009,076,000

Year	Expenditure ($)	Year	Expenditure ($)
1920	1,621,953,000	1955	8,788,000,000
1921	1,118,076,000	1956	8,588,000,000
1922	457,756,000	1957	8,972,000,000
1923	397,051,000	1958	9,131,000,000
1924	357,017,000	1959	9,533,000,000
1925	370,981,000	1960	9,453,000,000
1926	364,090,000	1961	10,145,000,000
1927	369,114,000	1962	11,248,000,000
1928	400,990,000	1963	11,476,000,000
1929	425,946,000	1964	12,011,000,000
1930	464,854,000	1965	11,552,000,000
1931	486,142,000	1966	14,732,000,000
1932	476,305,000	1967	20,958,000,000
1933	434,621,000	1968	25,222,000,000
1934	408,587,000	1969	25,033,000,000
1935	487,995,000	1970	24,749,000,000
1936	618,587,000	1971	23,077,000,000
1937	628,104,000	1972	22,596,000,000
1938	644,264,000	1973	20,185,000,000
1939	695,256,000	1974	21,395,000,000
1940	907,160,000	1975	21,920,000,000
1941	13,938,943,000	1976	21,398,000,000
1942	14,325,508,000	1977	23,919,000,000
1943	42,525,563,000	1978	26,019,000,000
1944	49,438,330,000	1979	28,770,000,000
1945	50,490,102,000	1980	32,601,000,000
1946	27,986,769,000	1981	37,620,000,000
1947	9,172,139,000	1982	45,281,000,000
1948	7,698,556,000	1983	51,520,000,000
1949	7,862,397,000	1984	55,655,000,000
1950	5,789,468,000	1985	66,708,000,000
1951	7,395,000,000	1986	71,107,000,000
1952	15,561,000,000	1987	73,808,000,000
1953	16,249,000,000	1988	77,315,000,000
1954	12,828,000,000	1989	79,973,000,000

Year	Expenditure ($)
1990	78,017,000,000.
1991	77,642,000,000

Sources: 1775–1950 figures from United States Department of Commerce, Bureau of the Census. *Historical Statistics of the United States - Colonial Times to 1970, Part 2* (Washington, D.C.: Bureau of the Census, 1975), pp. 1114–1115; 1951–1980 figures from Office of the Assistant Secretary of Defense (Comptroller), *National Defense Budget Estimates, FY 1988/FY 1989* (Washington, D.C.: Office of the Assistant Secretary of Defense (Comptroller), 1989), Table 6–13, "Department of Defense Outlays by Service"; 1981–1991 figures from Office of the Comptroller of the Department of Defense, *National Defense Budget Estimates for FY 1992* (Washington, D.C.: Office of the Comptroller of the Department of Defense, March 1991), Table 6–13, "Department of Defense Outlays by Service." Outlays through 1948 include Air Force outlays.

Appendix C

Strength of the Army, 1775–1991

Year	Total
1775	37,623
1776	89,651
1777	68,720
1778	51,052
1779	45,184
1780	42,826
1781	29,340
1782	18,006
1783	13,476
1784–88	Not available

Year	Officer	Enlisted
1789	146	672
1790–93	Not available	
1794	235	3,578
1795	212	3,228
1796–99	Not available	
1800	Not available	
1801	248	3,803
1802	175	2,698
1803	174	2,312
1804	216	2,518
1805	159	2,570
1806	142	2,511
1807	46	2,629
1808	327	5,385
1809	533	6,444
1810	441	5,515
1811	396	5,212
1812	299	6,387
1813	1,476	17,560
1814	2,271	35,915
1815	2,272	31,152
1816	735	9,496
1817	647	7,799
1818	697	7,458
1819	705	7,801
1820	696	9,858
1821	547	5,226
1822	512	4,846
1823	525	5,592
1824	532	5,441
1825	562	5,341
1826	540	5,449
1827	546	5,339
1828	540	5,162
1829	608	5,724
1830	627	5,495
1831	613	5,442
1832	659	5,609
1833	666	5,913
1834	669	6,361
1835	680	6,657
1836	857	9,088
1837	873	11,576
1838	717	8,480
1839	749	9,942

Year	Officer	Enlisted
1840	789	11,541
1841	754	1 0,565
1842	781	9,999
1843	805	8,297
1844	813	7,917
1845	826	7,683
1846	2,003	25,864
1847	2,863	41,873
1848	2,865	44,454
1849	945	9,799
1850	948	9,981
1851	944	9,770
1852	957	10,419
1853	961	9,611
1854	956	9,938
1855	1,042	14,869
1856	1,072	14,643
1857	1,097	14,821
1858	1,099	16,579
1859	1,070	16,173
1860	1,080	15,135

Year	Total
1861	186,845
1862	637,264
1863	918,354
1864	970,905
1865	1,000,692
1866	57,072

Year	Officer	Enlisted
1867	3,056	54,138
1868	2,835	48,231
1869	2,700	34,253
1870	2,541	34,699
1871	2,105	27,010
1872	2,104	26,218
1873	2,076	26,736
1874	2,081	26,559
1875	2,068	23,445
1876	2,151	26,414
1877	2,177	21,963
1878	2,153	23,870
1879	2,127	24,474
1880	2,152	24,442
1881	2,181	23,661
1882	2,162	23,649
1883	2,143	23,509
1884	2,147	24,519
1885	2,154	25,003
1886	2,102	24,625
1887	2,200	24,519
1888	2,189	24,830
1889	2,177	25,582
1890	2,168	25,205
1891	2,052	24,411
1892	2,140	25,050
1893	2,158	25,672
1894	2,146	26,119
1895	2,154	25,341
1896	2,169	25,206
1897	2,179	25,686
1898	10,516	199,198
1899	3,581	77,089
1900	4,227	97,486
1901	3,468	82,089
1902	4,049	77,226
1903	3,927	65,668
1904	3,971	66,416

Year	Officer	Enlisted	Year	Officer	Enlisted
1905	4,034	63,492	1940	18,326	250,697
1906	3,989	64,956	1941	99,536	1,362,779
1907	3,896	60,274	1942	206,422	2,869,186
1908	4,047	72,895	1943	579,576	6,414,896
1909	4,299	80,672	1944	776,980	7,217,770
1910	4,535	76,716	1945	891,663	7,376,295
1911	4,585	79,421	1946	267,144	1,623,867
1912	4,775	87,346	1947	132,504	858,781
1913	4,970	87,786	1948	68,178	485,852
1914	5,033	93,511	1949	77,272	583,201
1915	4,948	101,806	1950	72,566	520,601
1916	5,175	103,224	1951	130,540	1,401,234
1917	34,224	387,243	1952	148,427	1,447,992
1918	130,485	2,265,257	1953	145,633	1,388,182
1919	91,975	759,649	1954	128,208	1,276,390
1920	18,999	185,293	1955	121,947	987,349
1921	16,501	214,224	1956	118,364	907,414
1922	15,667	133,096	1957	111,187	886,807
1923	14,021	119,222	1958	104,716	794,209
1924	13,784	128,889	1959	101,690	760,274
1925	14,594	122,454	1960	101,236	771,842
1926	14,143	120,795	1961	99,921	758,701
1927	14,020	120,809	1962	116,050	950,354
1928	14,019	122,065	1963	108,302	867,614
1929	14,047	125,071	1964	110,870	862,368
1930	14,151	125,227	1965	112,120	856,946
1931	14,159	126,357	1966	117,786	1,081,998
1932	14,111	120,846	1967	143,517	1,298,981
1933	13,896	122,651	1968	166,173	1,404,170
1934	13,761	124,703	1969	172,590	1,339,579
1935	13,471	126,015	1970	166,721	1,155,827
1936	13,512	154,304	1971	130,261	971,872
1937	13,740	166,228	1972	105,364	686,695
1938	13,975	171,513	1973	101,194	681,972
1939	14,486	175,353	1974	91,873	674,466

Year	Officer	Enlisted	Year	Officer	Enlisted
1975	89,756	678,324	1985	107,027	675,695
1976	85,515	668,686	1986	109,013	672,596
1977	84,984	676,639	1987	108,910	665,194
1978	96,553	682,432	1988	107,907	660,304
1979	87,420	657,143	1989	106,228	658,031
1980	96,670	669,246	1990	106,255	643,938
1981	98,423	675,898	1991	103,951	635,643
1982	101,596	690,166			
1983	103,296	678,352			
1984	104,827	680,979			

Note: Reliable figures on the number of officers and enlisted personnel are not available for the periods 1775–1783 or 1861–1866. For that reason only the total number of personnel on the rolls is given. No reliable strength figures of any kind are available for the periods 1784–1788, 1790–1793, and 1796–1800. Enlisted figures include cadets, USMA.

Sources: United States Department of Commerce, Bureau of the Census. *Historical Statistics of the United States - Colonial Times to 1970, Part 2* (Washington, D.C.: Bureau of the Census, 1975), pp. 1141–1142; Russell F. Weigley, *History of the United States Army*, rev. ed., (Bloomington, Ind.: Indiana University Press, 1988), p. 600; United States Congress, *American State Papers: Documents, Legislative and Executive, of the Congress of the United States, Military Affairs* (Washington, D.C.: 1832–1861), vol. 1, Document no. 3, pp. 14–19; annual "Almanac" edition of *Defense* (Washington, D.C.: Department of Defense, 1980–1991).